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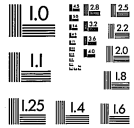

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Thomas A. Edison Papers

A SELECTIVE MICROFILM EDITION

PART IV
(1899–1910)

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START

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A Note on the Sources

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Notebook, N-05-09-25

This notebook covers the period September 1905-July 1906. It contains notes by Edison and unidentified experimenters, possibly Alvin D. Caskey and Charles Dally, relative to the electroplating of metals on electrodes for Edison's storage battery. Most of the entries pertain to the use of cobalt and copper; there are also entries for cadmium and antimony. The electroplating experiments found in this book were continued by Caskey in N-06-08-08.2 [not selected]. The front cover is labeled "Sept 26 1905 Caskey. Plating Vol I." The pages are unnumbered. Approximately 200 pages have been used.

Only the material by Edison has been selected.

Plating Machine Record

Firm Sept. 25, '05

N-05-09-25

Jany 3rd 1906

Things found out

1st 1st layer 3 min 15 amp for Cop
Subsequt layers 25 am 3/4 min
+ Co 30 amp 1/2 minute, it self peels
after 2 or 3 layers - dividing rod in -
by changing to
1st layer Cop 3 min 15 am
Subsequt layers 1 16 amp 1 1/4 min
+ Co 17 amp 50 sec it Dont peel

2nd -

At the top of drum if it dont come
to same point or place in the 2 solution
+ Copper plates on copper it sticks
+ cannot be torn apart - therefore, copper
of one layer should never be plated
on the Copper of the next Copper layer
I have not tested if Cobalt sticks to
Cobalt -

3rd

Where there are black streaks its to solution getting between layers, or running down from top or a hole full of it.

4th

Finger marks stains bad plating

5th -

That ruby surface is due to fine layers of gas bubbles -
The Copper under micro will in most cases show innumerable circular depressions over its whole surface, this is due to microscopic bubbles of air or hydrogen -

6

The steel strip is liable to bring solution from one bath to the other also rim on the drum if it hasn't a good fit. a bad fit leaves Caustic

7th

When strips are torn apart you always see copper on one side Cobalt on the other, never Cu & Cu or Co & Co. The reason of this is that when the Cobalt is put in the Copper the solution corrodes it without Current, but when the Cop goes into Cobalt val Cu Cant reduce it, hence the difference.

8

If the Cobalt film is left in the Copper Solution for 1 minute the whole of the Cobalt will be dissolved & go into the Copper Solution -

9

Copper deposited on Cobalt by reduction only makes an absolutely perfect deposit & the Cobalt deposited on it by Current is perfect,

10

The adhesion of copper by reduction is small – the Cobalt deposited at the density we now use & the solution we now use is so great that there is too much self peeling our density is 17 amp 50 sec –
Sulphate? Solution!
Chloride?

11

35 amp on Cobalt with 1½ lead drum is too great a density for the solution used it plates for an instant perfect then nubs reach out to get more Cobalt ions hence build up – 17 density gives good results –

Jan 2nd 1906

Test 199

Lead & Pb drum
Cu 50 Sec @ 6 amps
Co 1 min @ 16 "
5th coat started to break away from steel pin in drum
did not have a chance to try cutting in the groove

Test 11.200

Same as No 199 except cu wire in groove instead of steel pin
5th coat it started to break away from wire

Jan 3-06

Test 201

Used 95+5 with wire in slot

Cu plated 3 min @ .12 amps

Co " 1 " @ .15

This was no good owing to finger marks on drum

Test 202

Used 95+5 with wire in slot

Cu 6 min @ .6 amps

Co 1 " @ .15 "

2nd and following coats

Cu 50 sec @ .6 amps

Co 1 min @ .15

Stripped on 5th Co coat

Test #203

Used drum 95+5 with slot in edges of slot were rounded off with pen knife

Cu 3 min @ .12 amps

Co 1 " @ .14 "

2nd and following coats

Cu 50 sec @ .6 amps

Co 1 min @ .14 "

Continued to 8 coats

Tab stripped by cutting the plate down side of drum not using the slot to strip by

Test 204

Used same drum

Cu 3 min @ .12 amps

Co 1 " @ .14 "

2nd and following coats

Cu 50 sec @ .6 amps

Co 1 min @ .14 "

Continued to 2 coats

Peeled at knife cut after 2nd Co coat.

Jan 3-06

Test #205

Used drum as before except tar smoothed knife cut down with pen knife

Cu 3 min @ 12 amps

Co 1 " @ 14 "

2nd and following coats

Cu 50 sec @ 6 amps

Co 1 min @ 14 "

Continued to 3 coats which began to strip where the knife cut was, owing to not getting it completely smoothed over.

Test 206

Used drum as above after it was redressed.

Cu 3 min @ 12 amps

Co 1 " @

2nd and following coats

Cu 50 sec @ 6 amps

Co 1 min @ 15 "

Continued to 7 coats

Tar tried to strip by rubbing glass rod on side of drum and then taking knife and raising it at the point of rubbing and catching hold with fingers and tearing. Did not work very well.

Test 207

Used 85 + 15 drum without slot.

Cu 3 min @ 12 amps

Co 1 min @ 14 "

Edison 12

Copper got plating bad, it was so thin (with 10 amps which previously produced ok deposit) that it wouldn't self strip

We altered the solution — made no other changes, (how it worked off - probably dirt gets on cylinder by rotating which churns the solution + makes bad spots if they stick to cylinder hence points of weakness + we have self peeling

(10) I think both solutions should be filtered daily

Jan 4th 1906

Test 208

Cu 3 min @ 12 amps
Co 1 " @ 15 "
2nd and following coats
Cu 50 sec. @ 6 amps
Co 1 min @ 15 "
Plate nice and bright
Tried cutting with knife like shaving
Did very well
But plating has not the silk lustre it should have

Test 209

Cu 3 min @ 12 amps
Co 1 " @ 15 "
2nd and following coats
Cu 50 sec @ 11 amps
Co 1 min @ 15 "
tried stripping with needle

Test 210

Cu 3 min @ 11 amps
Co 1 " @ @ 15 "
After plating Co it was allowed to stand in Cu sol 5 sec without current. Did not improve much.

Test 211

Cu 3 min @ 10 amps
Co 1 min @ 15 "
2nd and following coats
Cu 50 sec @ 5 amps
Co 1 min @ 15 "
made Co sol quite acid
Plate has appearance of being much better.

Edison 13 -

I plan
In Cobalt solutions the reason they must be acid is that there is always at high density a tendency to deposit both metal & Hydroxide of the metal
This hydroxide is colloid + deposits metal through it but as the amount of Cobalt solution in the cloth of hydrate is small the deposit is enormous, thus a porous deposit which [illegible] out rapidly - [illegible] Thin deposits [illegible]

more hydrate, + we have filaments running out at right angles to the deposit — If we put acid in it dissolves the hydroxide as fast as formed + probably prevents its formation any solvent of hydroxide will answer that the reason Double Ammonium Salts used as Ammonia is a solvent of hydroxide —
Only sufficient acid should be used to counteract the tendency to deposit hydroxide —

At 6 P.M. added 15 drops of HCl to Co. sol. it was previously almost neutral —
The addition of acid made the sheets flexible + stripped the black filaments but not altogether the round rubs —

Edison 14

To stop peeling insulating varnish must be on both ends of in the solution –
To stop peeling in the intermediate space be sure there is no bad spots where it dont plate as it starts to tear at these points –

This way gives sheets all of which can be split whole & do not stick together & will go ok if can get rid of self peeling after 3 or four layers

From Copper plated thick polished –
then Cobalt plated thick & polished –
Then
14 Layers of a batch: 2½ amp 2 minutes in strongest Copper Sulphate (acid) –
Subsequent layers 2½ amp one minute.
Cobalt 15 amp 100 seconds
This is plating from a plain Chloride Co Solution 1.080 Spec Grav –

Jan 6 - 06

Test #212

Used Co plated drum
Solution #13
Cu plated 4 min @ 3½ Amps
Co " 2 " @ 12 "
2nd and following coats
Cu 4 min @ 2½ Amps
Co 2 " @ 12 "
Cu plating is very red.
Co plate appears dull, due
to the red copper

Jan 8-06

Test 213

Used Co plated drum "
Solution #1
Cu 2 min @ 7 amps
Co 1 " @ 15 "
Plating stripped after 1st coat
Cu plate appeared to be coated
with a white film

Test 214

Solution #3
Cu 2 min @ 7 amps
Co 2 " @ 12 "
2nd and following coats
Cu 2 min @ 2½ amps
Co 2 " @ 12 "
Co plate is very dark
Cu " is much better than
#213
Plating adheres to drum and
wear nicely.

Jan 8-06

Test 215.
Used Co plated drum
Solution # 3
Add 15 drops HCl to Co sol.
Cu 4 min @ 7 amps
Co 2 " @ 12 "
2nd and following coats
Cu 2 min @ 2½ amps
Co 2 " @ 12 "
Co plate appears much better
Cu plate appears very homogenous
1st coat stuck to drum sol.

Test #216
Used Co drum Sol #2
Cu 4 min @ 7 amps
Co 2 " @ 12 "
2nd and following coats
Cu 2 min @ 5 amps
Co 2 " @ 12 "
Did not adhere to drum very
bad but layers did not seem
to be separate

Test 217
Used Co drum
Solution #2 ½ strength
Cu plated 4 min @ 7 amps
Co 2 min @ 12 amps
2nd and following coats
Cu 2 min @ 5 amps
Co 2 " @ 12 "
stripped very good in places.

Test 218
Used Co drum
Solution ~~#2~~ ½ strength
Before using Co sol it was made
neutral by adding Co(OH)2 and
filtering, Anodes also were scrubbed
Cu plated 4 min @ 7 amps
Co 2 min @ 12 amps
2nd and following coats
Cu 2 min @ 5 amps
Co 2 " @ 12 "
although Co plated to become
self coated with Cu before putting
in current
Co plate was fine and bright
By adding the Co(OH)2 it

218 Cont

have removed some of the Jts.

$CoCl_2$ Sol 1090 plate too galvanic
+ brittle self peels before can get
1st Eq Coat on Copper –

219

Co plated drum:
$CuSO_4$ 1190 10cc acid –
1st Coat 2½ amp 8 minutes
Subsequent Coats 2½ amp 5 minutes
Cobalt – 18 amp – 1 minute
Peels on 1st Coat – Comes off easy
+ Curls up several turns,
Extraordinarily brittle –
I cleaned the drum + then deposited
the 1st layer of Copper & found it
stuck to Cobalt & said drum
perfectly tight so it was impossible
to peel any off even 1/32 after 1
Coat Co put on
I then plated copper on the Eq Co
Cylinder surface + then
put it in Cobalt ~~[illegible]~~ 6 amp
for 3 minutes using a Carbon
Electrode + disconnected the Co
Anode – The plating was
not shiny but irregular soft
+ not shiny + the 6 sheets were
quite flexible – While plating
I noticed strong Ozone +
as I only used the Carbon Electrode
on the 1st Co plating + not

afterward — The ozone smell in the liquid continues during the peeling of the other coats — after 1/2 hour it is still strong — It seems to dissolve in the liquid — Possibly it peroxidizes the $KClO_3$ — this keeps decomposing giving off Ozone — The effect at any rate of the ozone is to cause a non glassy shining deposit which isn't spongy — This is probably due to the ozone continuously reducing the Hydrogen & preventing it from depositing with the metal. Hydrogen is supposed to make metals brittle. 3 minutes at 6 amperes probably makes more ozone than is necessary. 1 minute at 6 amp would probably do for 2 or 3 hours. Possibly a small Carbon Electrode could be connected to the Pt anodes so as to form the right amount of Ozone to take care of the Hydrogen. Even Chlorine water might answer. — If a Carbon Electrode

is used I guess 1% of the total
anode surface would be
sufficient —
The same effect could be
produced with Copper if a
Chloride was used $CuCl_2$
or $CuCl_2$ in salt solution
plated 2 Copper Cylinders
12 amp 30 hrs + the Ozone
still is effective —
plated 2 or 3 Cylinders full
Co layers. The Co plating
is not shiny but its perfect
fine grain no holes or sheet
effect coming off is flat
Can split them all but they
stick hard together yet pull
apart — The 1st layer comes
off perfect and 1/2 the
cylinder the other 1/2 sticks
partially due to bad
places on Cylinder — if could
get more margin in stripping
think should be OK —
Evidently Ozone or something
to take care of the Hydrogen
is necessary — The reason

~~Ga~~ plating good

1st Layer Copper	12 amp	2	min
other Copper layers	12 amp	1	min
Cobalt	18	1	min

We got good plating before at tips was that anodes got coated + somewhat insulated + this reduced the surface so much that at the density used the carbon particles permitted Chlorine to be given off + thus either acted as oxidizer or Ozone formed — When anodes cleaned there was no free Chlorine or Ozone hence the deposit became bright + brittle from absorption of hydrogen —

Jan 9-06

Test 220

Used Co drum
Solution + 14 Cu
Cu 2 min @ 12 amps
Co 1 " @ 18 "
2nd and following coats
Cu 1 min @ 12 amps
Co 1 " @ 18 "
Plated 5 coats
Cored not strip
Cu plate was red and a
white film over it
Co dark owing to above

Test 221

Used Co drum
Solution + 8 Cu
Cu 2 min @ 12 amps
Co 1 " @ 18 "
2nd and following coats
Cu 1 min @ 12 amps
Co 1 " @ 18 "
Plated 2 coats Plate very rough

Test 222

Co plated drum
Solution #8 made alkaline by NH_4OH
Cu to co plated as in 221
Strips well from drum

Copper is not reduced by Cobalt
in a Solution of Double
Sulphate of Copper & ammonia
with free ammonia.
Sheet strips well.

Test 223

Co plated drum same as # 222 except
Solution #8 made alkaline by NH_4OH
used for 1st Cu coat subsequent
coats used # 2 Cu.

Jan 18-06

Test 224

Used Co plated drum
Solution #16 Cu Reg Co Sol
Cu plated 2 min @ 12 amps
Co " 1 " @ 18 "
2nd and following coats to 10
Cu 1 min @ 12 amps
Co 1 " @ 18 "
Plate a little rough
But stripped from drum fine
Duplicated this 3 times and
all came off without any
trouble

Test 225

Co drum Solution #16 Cu
Cu 2 min @ 8 amps
Co 1 " @ 18 "
2nd and following coats to 5
Cu 1 min @ 8 amps
Co 1 " @ 18 "
Plate still rough but does
not adhere to drum

Jan 10-06

Test 226

Solution 16 Cu Co drum
Cu plated 2 min @ 6 amps
Co " 1 " @ 18 "
2nd and following coats to 5
Cu 1 min @ 6 amps
Co 1 " @ 18 "
Plate still very rough
Probably due to the crystallization
of the salt on anodes and jars

Test 227

Co drum Sol 16 Cu poured off
from crystals in jar of 226
and 10% water added
Cu plated 2 min @ 6 amps
Co " 1 " @ 18 "
2nd and following coats to 7
Cu 1 min @ 6 amps
Co 1 " @ 18 "
This adhered to drum very bad.

Jan 10-06

Test 2-28

Co drum Solution #16 Cu with made
~~acid~~ 10 drops H_2SO_4 added
Cu plated 4 min @ 6 amps
Co " 1 " @ 18 "
2nd and following wash.
Cu 1 min @ 6 amps
Co 1 " @ 18 "
2nd wash 1 very rough.

Test 2-29

Co drum Solution #16 Cu made
alkaline with NH_4OH full strength
Cu plated 4 min @ 6 amps
no deposit.
Made another 4 min but
still no deposit

Jan 10-06.

Test 230.

Co drum Solution #16 Cu made alkaline by NH_4OH diluted 1/2.
Cu plated 4 min @ 6 amps
Co " 1 " @ 18 "
2nd and following coats
cu 1 min @ 6 amps
Co 1 " @ 18 "
Plated 7 coats
The appearance under micro much better but still a little rough. - stripped fine and drum still retains its high polish, which indicates no reducing action on the Co in this solution

Test 231

Co drum Solution #16 Cu which had been made alkaline by NH_4OH has not been made acid by H_2SO_4 and diluted to 1/2 strength.
Cu 4 min @ 6 amps.
Plate was as though it was burnt and appeared pulverulent in places.

Test 232

Co drum same oil as 231 except it has been made decidly acid.

Cu plated 4 min @ 6 amps
Co " 1 " @ 18 "

2nd and following coats
Cu 1 min @ 6 amps
Co 1 " @ 18 "

3 coats rough as the [illegible]

Test 233

Co drum same oil as 232 but it has been filtered

Cu plated 8 min @ 3 amps
Co " 1 " @ 18 "

2nd and following coats
Cu 1 min @ 3 amps
Co 1 " @ 18 "

10 coats

Jan 10-06

234 = diluted 232 1/2 - Nq - added
lot Sulphate ammonia & used 6 amp
Nq - Threw it away

235 No 10 Solution 20 drops Chlorine
Water in ~~[illegible]~~ CoCact solution on
234 = plated No 10 just as it is
2 cc acid =
It stuck rather bad - deposit wanty

236 - Started Copper on first
Coat with One amp and for 10
Seconds then put on 12 amp 2 min
Subsequent deposits 12 Cu 1 min
Co 1 - 1 min - did not stick
Came off in perfect sheet - Deposit
Wanty

237 - Same as 236 Except filtered
the CoCact Solution - full of
fine black floating particles.
Thought perhaps this gave the
wanty surface - It stripped perfect
but was not as wanty Evidently do
goo or Chemistry pbly goo

Jan 10-06

238 – Same as 237 but with 100 drops Chlorine water, after stirring could just smell the Ozone smell – current rate same as 236 – The blues are nearly gone – strips fine – Evidently the Chlorine removes the hydrogen Evidently –

239 – Added 100 drops more of Chlorine water – Strips perfect, Waste still less – a little more Chlorine would prob do the Ozone –

240 added 100 drops more of Cl water still less waste. strips good.

241 added 100 drops more of Cl water still less waste strips perfectly

242 Added 100 drops more Cl water still improving strips perfectly

243 Added 100 drops more Cl water surface about the same @ 242

Jan 11-06

Test 244

Co plated drum Solution #10
Cu plated 2 min @ 12 amps
Co " 1 " @ 18 "
2nd and following coats
Cu 1 min @ 12 amps
Co 1 " @ 18 "
Plated to 10 coats very fine
Stuffed perfectly
Duplicated 3 times all good

Test 246

Same as 244 but for
Endurance.
Continued to 20 coats
Not so very bad

Jan 22-06

Test 246

Took some of solution from work that would not plate right on large drum and purified it by peroxidizing with H_2O_2 and boiling with Co $(OH)_2$

Cu plated Co drum 2 min @ 2 amp
Co 1 min @ 18 amps
2nd and following coats
Cu 1 min @ 12 amps
Co 1 " @ 18 "
The above sol after purifying was diluted to 1053 Sp Gr and 20 CC of Saturated Bromine water was added.
Used Cu sol just as made up for large drum
Plated 10 coats was nice and bright but very brittle, indicating too much Hydrogen.

Test 247

Same as 246 except added 10 CC more of Bromine water to Cobalt Sol. very bright & stuck

Test 248

Cu plated drum 10 min @ 2 amps then 2 min @ 12 amps
Co 1 min @ 18 "
2nd and following coats
Cu 1 min @ 12 amps
Co 1 " @ 18 "
Add 10 CC more Bromine Water
Stripped bad

Test 249

Cu plated same @ 248
Add 10 CC more Bromine water
Stripped better but a little rough

Test 250

Add 10 CC more Bromine water
very rough

Test 251

Now using reg. Co plating sol.
and Cu plating sol from Impetaire
Add 10 cc Bromide water to Cu sol
Cu plated 2 min @ 12 amps
Co " 1 " " 18 "
2nd and following coats
Cu 1 min @ 12 amps
Co " " @ 18 "
Plated 2 coats
2 coat of cu began to burn

Test 252

Same as ~~above~~ 251 except
1st coat Cu .4 min @ 6 amps
Co 1 min @ 18 amps
2nd and subsequent coats Cu
2 min @ 6 amps

Test 253

Add 10 ~~cc~~ mg Bromine water to Cu Sol.

1st Coat 10 sec at 5 amps then 2 min @ 1.2 amps

Subsequent coats 1 min @ 1.2 amps

Co 1 min at 1.8 amps

Test 254

Got fresh Cu Sol from crock

add 10 CC of Cl water

Cu plated 10 sec at 3 amps

Then 2 min @ 1.2 amps

Subsequent coats

Cu 1 min @ 1.2 amps

Co 1 " @ 1.8 "

Continued to 10 coats,

Came off very good.

Jan 22-06

Test 255

Make up of Cu of the Bromine sol to 1.070 the same as reg Co

The old Co solution that we had several days ago the Carbon Electrode works OK but the solution we had up then that failed & stuck to drum wouldn't work it was to shiny & brittle stuck to drum - got rough a few while - We put 70 cc Saturated Bromine Water in - It plated just as shiny & was brittle -

We now take the same solution & put Carbon anode (electric arc Carbon) 3 minutes 4 amperes The Co plating is dark on 1st Coat - liquid smells strong of Cl or Ozone - 10 layers plating OK the good dull appearance & smooth no waste to the eye - The final layer of Copper stuck to the drum - Evidently the Copper

needs the same ozone or therefore
be more selfred action of Copper
by the bath Cobalt dream so it
will not attack
We are duplicating it with
same Copper sol & Co solution
after the latter has been used
for 10 layers - its still dull Co.
2nd 10 layers came off good -
I notice that the layers cannot be
split -
The 3rd Trial same Cobalt
Same Copper except about 10 or
15 CC H_2O_2 added to peroxidize
the Iron with the Copper to see if
this prevents the final Coat
flaking on Chiselling heat &
also Experiment splitting Coats
Co plated dull - good,
Copper good - The 10 layers came
off perfect - Plating on 10th
layer on Cobalt very good fine
grain - There was some warts
but not close together -
Could not split sheets -
This plating would be off
if splitting off sheets is not

necessary think 15 coats or
Even 20 would be practicable
as far as plating is concerned —
Evidently peroxidizing the Copper
Solution by H_2O_2 is a good
thing. Think warts may be
due to air or float stuff in
liquid —

One thing is certain that
Dull Cobalt plating is necessary
to prevent brittle self cracking
flaking — + this so far is
best attained by Bromine water
+ I think not Chlorine but is
attained by a Carbon Anode
4 amp — 3 minutes in Cobalt
Solution while drum is being
plated — but it shows up bad
on the 2nd Drum —
Possibly H_2O_2 will do as well

Also this treatment will
last for several Drums of
10 Each + how much longer
not known —

We now have the same Copper
Solution with the H_2O_2 put in on
3rd Drum trial —
The Cobalt is a new solution
from big Crock upstairs
which dont plate right as it
plates bright on brittle
Into this Solution I stir
10 CC of H_2O_2 to see if H_2O_2
is a substitute for the Carbon
Electrode Chlorine Ozone —
The 1st Coat of Cobalt was
bright so I added immediately
10 CC more of H_2O_2
This brought the 2nd layer of
Cobalt quite dark darker
than it showed 6x, probably got
too much in - on plating the
with Copper it was all brown
and it washed away (12) both
the Cobalt & the Copper plated
Red like over it — I now put
it back in the Cobalt to
see if it plates — it plates
the right Color - Lead Color OK -
The next Copper plates red
probably because the Cobalt

is oxidized - Evidently only
Enough H_2O_2 to peroxidize the
Iron & Can be used any excess
oxidizing the Cobalt
Had to give this Drum up -

Allow the Cobalt Solution to
rest 10 minutes to use up
some of the H_2O_2 & Start a
fresh drum - Its no use -
Copper got red on 2nd Coat
I wait 10 minutes more
& try =

1st Coat on Cop dark blackish
2nd Coat Copper Red - Strip
right off showing Cobalt
replated on oxidized -
Too much H_2O_2 in Cobalt
Solution

Another attempt -
Co dark blackish Copper -
Red all came off nicely
in Cu Solution

Filtered the H_2O_2 Copper Sol.

The put Coat Copper on Reg way - then put in the Cobalt Solution we have been using that has the 20 cc H_2O_2 & used Carbon anode 4 amp 3 minutes.

1st Coat Cobalt bright.
2nd Coat part bright part streaky dull, next Coat Copper ok in places Red & spongy in others

Another attempt start fresh & pass 4 amp 3 minutes again through the solution perhaps want this to neutralize the H_2O_2 = 1st Coat Lead Color fine 2nd Copper Coat ok = 2nd Co Coat good Lead Color - 3rd Coat Copper ok - 3rd Coat Cobalt ok guess all are ok The Chlorine gas

Evidently neutralized the H_2O_2 & then the Extra dose brought the Solution up OK —
Sheet came off OK Except one small spot this stuck hard — This shows that the kind of Polish & surface must be Experimented with,
There were some small warts but not Enough to harm but still more than there should be = The cause of of these warts must be ascertained before we are sure of permanent results,

Same Solutions (1c) Cobalt with 20 cc H_2O_2 thence twice with Carbon anode 4 amp — 1 min Each time Copper 10cc H_2O_2 I now put in 20 CC more H_2O_2 making altogether 20 CC of H_2O_2 in the Copper Solution,

1st Cobalt Lead Color rather blush with a bright streak at bottom, 9th streaky - Color ok - the Copper dont seem be streaky only the Cobalt to req good Lead Color + then finish brighter streaks - The 4th Coat Cobalt is not so streaky - 5 Coat Cobalt still less streaky - 6th Co Coat streaks nearly gone - good Lead Color - 9 Coats pretty good stripped ok except in one place -

Noticed Phenomena - The first layer bright side of Copper (when sheet stripped) coff had warts on extending outward on looking at Cylinder found it pitted bad over, The primary Coating is pitted so you can put Drum under Micro + look down into the holes see the original Copper - I discarded this Drum

I notice that even the best ones are pitted but some although pitted do not extend very deep. I believe this is the cause of Warts & also difficult spots where sheet sticks to drum —

We make another trial — same Copper Solution which has 20 cc H_2O_2 & put in 10 cc of Chlorine water — The Cobalt Sol is from upstairs that was treated with H_2O_2 20 cc & then twice with Carbonate. The Drum is fair & has few pits. 1st Coat Cobalt very streaky part of streaks are Lead Color & the other streaks are brighter than the right Color. When the Copper plates over the Cobalt streaks the Copper is bright where streaks are bright & not so bright but OK where Co is dead Color. 6th Coat Co not very streaky they have almost disappeared

good Lead Color — good
Copper plating —
The Co Coating 80% of the
sheets disappeared almost
uniform Lead Color — Remember
this is a good drum.
Come off all but stuck in spots
upon investigating found the trouble
is holes in the Original Cobalt
base —

Found that all our drums have
lots of holes & I think this is
trouble of sheets sticking along
the Canal of stuck as liquid
gets in these holes & if water
gradually goes out or retaining
& keeps Co. from touching or
rather dilutes & make spongy
plating — also, as we pack
the cylinders more holes are
uncovered, some just the top opens
& shows small hole & on further
polishing it gets bigger as
the original hole is due to a
bubble or a dirt spot on the
Copper

It is going to be very essential that the base coat of Cobalt must be free of bubbles, holes etc & there is going to be a very difficult thing to accomplish

Using the same solutions as last used (10) the Cobalt which is from upstairs & had 20 CC H_2O_2 & two applications of Carbon anode — We plated a Copper drum with 4 amperes one hour. The coating is fine but there are several places which show which opals under the microscope they are slight irregular depressions 4 or 5 times the diameter of a bubble hole. There is no hole to be seen but undoubtedly it indicates a hole underneath which in polishing will be brought out to start with. There are probably more than 50 of these opals — The general plating is very fine —

We now start plating with the Copper solution that had 20 cc H_2O_2 + afterwards 10 cc Chlorine Water + the Cobalt 20 cc H_2O_2 + twice Carbon anode 4 amp 3 min each time with the newly plated Cylinder

1st Coating Cobalt streaky Lead color & brighter – I can't make out what causes those streaks to stop them we rotated the Cylinder as it passed out. We Cobalt solution but this didn't stop streaks possibly the streaks are due to the Copper getting with the Chlorine in but I don't think so. – 6th Coat Cobalt streaks are gradually disappearing approaching a uniform Lead Color – 8th Cobalt uniform Lead Color Came off – but streak in many places especially the holes also in places where there were no holes – where streaks

1st appeared - There must be no streaks on the 1st Coat of Cobalt

We are now going to clean the drum by pumping Rinse with Water and then use drum as a Cathode in 10% KOH using the same Co & Copper Solutions we have been using -
By mistake we put the drum in KOH as Anode
Thought we would try it that way - put on only 1 Co Coat it was very streaky - It stripped fine probably because Co was oxidized by being anode in KOH has a lead colored tinge showing slight oxdn. This may be just what wanted for the 1st Coat,
Thinking that the Cobalt

so full of specs we filter
& found it so - Will try
again & see if filtering
stops the streaks if that
Lucke gave it another
Carbon anode again —
filtering didn't cure the
streaks on 2nd Co Coat.
I put in Carbon 4 amp 3 mm
the Coat was fine - Even dead
Color — little brighter than usual

Therefore streaks are due
to something neutralized by
the Effects of the Carbon
Anode. Chlorine Ozone etc,

3rd Coat Cobalt fine,
Stripped perfect inside & Copper dull
not shiny as here before, because
primary load of Co is exhausted
by 6 amp anode — KOH 10%
used 12 amp 15 seconds — KOH

Jan 23-06

I think this will always permit stripping

The Cobalt Solution lost its grading about 2 hours after application of Carbon Anode.

#257

Took drum plated 1½ hrs @ 4 amps
Punised it and treated as cathode in KOH 15 sec at 12 amps
Then put rubber band at both ends of drum to see if it would help in stripping the wax off.
The Band are of great service at the ends as it saves the cutting of the plating - but it seems to have a tendency to build up and become rubby for a distance of ¼ inch from bands. This will do no harm as it can be trimed off before final cutting up.
During this test the Carbon Anode was used again 3 min @ 4 amp stripped perfect.

Jan 23-06.

Test 258

Took another drum and treated it as cathode for 15 sec at 20 amps then washed and plated Cu at 5 amps for 10 sec then 2 min at 12 amps in the Cu sol which was used during night of 22nd

Subsequent coats of Cu are 1 min at 12 amps

Co sol same as used this morning

Co plating has the usual dull appearance - This drum has the rubber bands at top and bottom

After a few coats ~~on~~ on the rubber bands become coated

Continued to 10 coats

Comes off perfect, some warts

Can't notice any made or warts on 1st Layer Copper

Have plated 15 amp hours since using Carbon - (13) 1 prime Coat Co 4 amp 1½ hours & 27 Coats 15 amp 1 min

Total 1 amp for 15 hours -

1500 cc Solution - This melts 260 with addition 3 layers more

Jan 23-06 Test 259

Tested a smooth drum in
KOH 15 sec at 12 amps as anode
washed thoroughly and plated
Cu 10 sec at 5 amps then
3 min at 12 amps
Rubber bands at top and bottom
Subsequent coats of Cu are
1 min at 12 amps
Plate has bright appearance
Comes off perfect under Copper
than 258 = which is due to anoding
the primary Cobalt surface
Blade mirror warts on last layer
than 258 — no warts on 1st layer
Copper made — 258 & 259 —
Primary Coat Co 4 amps 1½ hour
.28" Surface Bypass. 7 inches
to Copper — ~~Original Copper~~
~~buffed~~ Original Copper not buffed
but Cobalt surface was buffed.

Jan 23 06

Test #260

Used drum which the cu was buffed then plated 1 1/4 hrs @ 4 amps in Cs sol then buffed again Tested as cathode in KOH for 15 sec at 20 amps then thoroughly washed (no pumice) and Cu plated 10 sec at 5 amps then 2 min at 12 amps Subsequent Cu crate 1 min @ 12 amp, Came off perfect - The drum has original Cop. + Cs buffed - No holes Copper very polished -

Jan 28. 06

Test 261

This drum is used after stripping plating of #260 without any ~~do~~ treating further than dipping in water. The surface had a slightly dull appearance.
Continued to 10 coats
Came off ok except at Edges where it was undoubtedly dirty - it stuck here very bad about 1/8 to 1/4 from each edge — Bubbles few —

This seems to show that we must have Clean drums to start with

I notice that scarcely a wart on 1st Copper none on 1st Cobalt
Then Each section of 2 or 3 layers have more + more warts

Therefore gas is produced on every layer + these starting Oxide buildup —

Test # 262

After stripping plate # 258 off Cathodes in 1 m KOH and plated Cu 10 sec @ 5 amps thin 2 min at 12 amps

Before putting current on when dipping in Co sol the drum was allowed to run 10 sec to allow the thin film of water which adheres to drum after washing to become mixed with the solution so as not to have bubbles form if this is the cause on plating 4th Co the current was put on at 5 amps for 3 sec by mistake before allowing to run any length of time.

Plated 10 coats.

Came off OK except 1 small spot on one Edge where perhaps some Copper was left, usual number of warts

Note we have plated 60 Coats with one full prime plating from Co Solution Total 1 amp for 24 hours without Solution gone bad since last anoding with Carbon Electrode – since this 30 more layers making 9 more amp hours or Total of 33 amp hours. When solution started streaky on 1st Coat, ha treat with Carbon anode –

263 – after stripping 259 – was made anode in KOH & in plating on Cobalt when Cu put in Co allowed to revolve 10 sec before current on – stripped perfect – Copper dull Usual number of warts

264 = Using same Cylinder as 263 without doing anything to it – but re anoding it in KOH – some Co also appeared on copper after 3rd layer. Came off at perfect Copper dull but drum fairly clean – The checks showed that they were Enormously built out warts –

It looks as if warts were due to gas & building out from very small projections in dent spots – This showed be helped by putting anodes 33% further away from the drum

265 = Anoded same Cylinder as used in 263 & 264 again — KOH, 1st layer Copper showed a rough section,
Possibly wrong Cathode drum 1st & then anode it — or only use Cathode, further experiments will prove which has the most Margin —
Jan 24-06
Daily last night plated with same drum as used in 263 which drum was plated with Cobalt 4 amp 1½ hours & showed no pits — Daily plated 4 times 10 layers each. The drum was found pitted — I looked at it this morning & found thousands of holes deep & round clear down to the Copper —
Evidently these holes were in the original plating & the wire burned over by galvaning —
They are Either due to gas or spread on the original Copper surface,

Jan 24-06.

Evidently We must find out how to plate the thick Coat of Cobalt on drum without holes –

Washing the drums in two jars
Ng – 1st jar gets full Copper & Co Salts, the one dark show but undoubtedly has it. Must have a Shower bath for 1st Cleaning then the 2 jars, the last jar to be supplied every drum fresh fresh Water put in –

Notice majority of holes are along a scratch mark in the base, probably in using pumice cloth etc these scratch marks fill with non Conductor + the plating starts bad, also the sharp Edge of the scratch is the place where gas would naturally cling – We shall have to Cathode with a heavy Current to clean these scratches.

Jan 24-06

out by heavy production of Hydrogen —

Possibly as Copper & Cobalt absorb Hydrogen that it passes out of plating & forms microscopic Bubbles

266 = With rather bad drum having some bad pores & holes etc We are trying something new — Used Regular Cobalt Solution that was used yesterday — all thought last night & all day today — But just put Carbon anode in 4 and 3 min. Used new Copper Solution from upstairs which was purified by Cooky & Dr G — not entirely free from nickel — Put in 50 cc of Conc Chlorine water = The first Copper Coat was the most Even & Beautiful we have yet seen — The Cobalt was equally perfect to the Eye —

We tried Experiment of putting Cobalt drum in Cop Sol to see then took out & washed & soaked it in water to get rid of the Co Sol – then put it back in Cop Sol & put Current on Ordinary that Salts left in reduced Co was Carbon gas – results negative no improvement,

We are using Rubber Bands on End Cylinders at first they plated over & were bad. Cookey treated them all night Dry KOH 10% – Now they are O.K. & don't plate over at all – They will be OK for Big Drum –

Evidently putting Chlorine into the Copper to the Extent named makes fine Even plating – the 10th Coat will Tell, if they do coat still beautiful & even = its the good Lead Color but of lighter hue than previously obtained with Big lot Chlorine in Copper)

Stuck to drum bad –

267 We try it again with a Copper drum – Buffed – The idea being that in 266 there was too much free Chlorine & that now the Iron is all passivated & the Chlorine Combined with the Copper So perhaps it will not stick This is the worst stick sheet we ever had Could not get first Coat Copper off at all Even with a Knife This shows It was cathodic – KOH That too much Chlorine in Copper makes 1st Coat Stick on Cobalt –

The next thing to try is to get CP Copper Anodes & Solution

and see if the good plating obtains
+ no chlorine is necessary = If it
sticks then - then perfect plating
will not answer, but the impurities
must be in to permit of stripping
Easy =

Any Copper Solution getting
in under 1st Coat Copper
Eats & Rots in the prime
Coat of Cobalt
The reason why the Cobalt at
Edge of Rubber Band was
Eaten down was probably
due to Copper Solution
not Being washed out under
Band.

268 –

We now try plating with Zinc from double Chloride of ammonia & Zinc, on a Copper 1st Coat over Cobalt drum —

Used Cobalt solution we set aside day before yesterday, but Chlorinated it with 2 Carbons 4 amp 3 minutes —

Plated Cobalt over 1st layer Copper — 18 amp 1 min than Zinc 15 amp 1 minute 100 on —

The Zinc Sol was made by dissolving Zn hydrate in Chl Ammon Can't get strong solution this way

Watts gives Chloride Zinc Chlorinated I guess —

On 4th Co deposit itself stripped as a whole + dropped down —

269 = Made Solution Chloride
Zinc 1.079 Spec. g — Reduced the
specific gravity somewhat by
adding Water. There was not
Enough solution to fill jar —
probable S. grav 1.1 25° or thereabout
This is Comed Chl Zn but very
white or I think not much
iron in it =
Plated drum after Cathoding
— KOH to clean it — with the
Reg 1st Coat in plain alk Cop
solution no Chlorine in it —
Zn plated on Copper 12 amp. 1 min
Cobalt on Zn : 18 amp 1 min rus on
1st Coat zinc blue and apparently OK
1st Coat Cobalt only fair, not even
probably due to poor Copper plating
or acid of Co solution attacking + gassing
Zinc — 2nd Coat Zn not very good,
Stopped at 6 layers Co got too
bad — strips OK —
plating not so bad —

270 – Duplicate of 269 –
Except 5 cc Chlorine in
Zinc Chl Solution –
Its plating a little yellow
Ng – stuck to Cylinder Bad
Zinc only powdery –
Chlorine made it stick like
it did when I used too much in
the Copper solution –

271 = Sulphate of Zinc, Specific G
1.150 – Coopers Sulphate, dissolved
distilled Water & filtered nothing
Else done Think it full of iron –
Coppered drum 1st after Cathoding
in KOH –
1st Coat Zinc good = 1st Co not perfect
black specs at places –
4 Coats Ng – stuck tight on
drum Coulent get it cut off.
Why? – Used Reg Copper bath
that we used all day that
came off fine –

272 We now use the Co solution
old one not the good one same as
used — 270 — a good Copper
sol we used today a use —
Lead-Antimony alloy — used
Rubber ring — Polished Copper
very used — got fresh solution
from up stairs which we
are now using but its just
as acid — 7 layers Co —
Came off ok except 2 spots where
1st layer Copper stuck & adjacent
layer Co came with the sheet
also the sheet pulled out holes &
of pieces of lead leaving Cylinder
plated terribly —

273 = We made a cylinder of pure
lead used baths same as in 271
plated good — 7 layers —
Came off at all stages
perfectly to lead —

274 – finding that Copper dont stick to 90 Lead 10 Antimony but sticks Lead to Lead alone I concluded that what is wanted is Antimony drum – Couldnt make it of Pure Antimony on account of Crystalization so I tried another piece of 75 parts Antimony 25 parts Tin to lengthen it – found button very hard brittle but without blow holes where chilled & took a beautiful polish – tried plating Copper on it beautiful Coat had no sticking properties whatever came off as flake –

I find this alloy does not self reduce the Copper Sulphate Sulphate – hence deposit is a true plating

tried plating Cobalt direct it also dont stick, it peeled itself

Fred Ott succeeded in moulding a drum by putting alloy in mould of Heat Cooling Cobalt plunging in Water. Shell was oval so in Turning it up he had to go below the chill where it is Crystalline - The drum also has pits from the surface because he was afraid to turn off too much. However the major part of the surface is good. When we get a good mould think can get fine results. Alloy does not show any tendency to have pin holes. The alloy is so hard that the Sheet can be cut off just as with Cobalt and fade if edge of knife is thin & sharp and will turn the Edge before cutting much of any -

Possibly we can use 66 Nickel & 33 Tin & give no more marqui-

275 - Made an alloy of 50 part Antimony and 50 parts Tin
This is quite hard and will strip as well as the 75+25 and is very brittle. —
You didnt try it — I did + Copper sticks —
Edison
You tried your own mixture
Forgive me — E —

276 = Made a Solution of 50 cc Water 100 CC HCl Concentrated 200 grammes Tartar Emetic I dissolved ok by stirring + gentle warming - it fellow very slow so gave it up but showed Geo fellow
Used small Lead drum plated with Copper + palmed —
put drum in Solution of Antimony with 2 amp it fell to 1½ in ½ minute - ~~to~~ Reversed Current for 5 minutes - plating like plated steel, beautiful but some large round warts

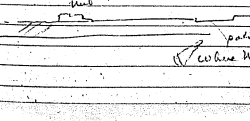
these could be broken off by edge of knife left no hole but a break in surface — The solution is as thick & viscous as Conc. Sulphuric acid and when put drum down probably took air & solution was so viscous they wouldnt leave cylinder — I diluted the solution about 1/8th by adding a solution of 1/2 pts water to 1 of HCl — pouring the thick solution in the H_2O HCl solution & not the opposite — The above drum had 1st Coat put on the moment I started to cut it broke clean across & jumped off the drum perfect not a nob on inside — Even the Cobalt which had more solution than Copper & plated higher up & directly on the Antimony came off perfect possibly 1st Coat Copper not necessary WE are now going to plate a drum with the very thick Coat of Antimony to see how

thick we can go before it cracks & peels off itself —

277 = Started plating Aluminum from the thinned down solution. Whole drum immersed worked ok for 4 minutes at 2 amp then specs appeared ~~on~~ in 5 minutes. Most of specs under microscope shows flat & not round nobs as previous experiments — by using edge of knife they come off & show good surface of aluminum beneath so they must be due to gas. We now polish the Sb deposit up to remove the knobs & replate to see if it goes bad again in 5 minutes. If it don't possibly there are fine holes or bad places on the copper. Tried unpolishing removing 1 or 2 spots clean down to the copper — Tried silver drum but same knobs appeared —

I notice Anode gases at
2 amp on Silver dishes & by
stopping drum covered see
a few gas bubbles on drum
The Solution is also getting
full of ~~[illegible]~~ specks — the
Anode no Blue — a brown
dust is appearing — there should
be 6 strips in place of 2
Cathode should make these —
also ask Lyseley to test
the Antimony ~~for~~ tell him about
the brown mud —

The Silver plated drum was
left for Cooper to put out
came out of the solution —
lots big nubs plated up for
14 minutes. 1 @ 1½ amp —
when nub is broken off there is
a pitted surface below



This shows its not a hole — but dirt deposited — that made high resistance through it — the high rate made a large mub — if it was good can't see why they should be — if dirty but it may be good —

We filter the Solution all night in the morning the solution makes 4 more and output in Vessel 2 amp 4 run. Annull chrome until you get mubs see how many amperemuncles you go before mubs appear you can stop Wash & keep current on to see this! — Daily will plate the bells chrome all night with copper. —

~~Dont use anything wet~~ ~~put it in the Antimony solution~~ ~~the Water turns solution white~~ ~~by decomposing it~~

Dry the drum with paper perfectly dry before putting in Antimony solution —
Don't try to dilute the solution by water —

278 Took Cu plated drum and plated antimony at 2 amps for 18 min - Lots of nobs.

279 Took Cu plated drum and plated 15 min at 1 amp Still lots of nobs.

280 Plated drum 20 min at 350 miliamp not quite so many nobs

281 ~~Immersed~~ Cu drum into Sb ~~Sol~~ ~~and~~ reversed 5 min then turned on current plated 15 min @ 350 ~~mil~~ amp was about the same as 280

2-82 Reversed drum and put on current before immersing drum. then plated 15 min at 400 ma/d. – This was a little better

2-83 There is a white sediment falling to bottom of jar
Thread has not been a drop of water put in sol.
Reversed drum (at higher speed) turned on current before immersing
This made a great improvement

2-84 The white sediment is still increasing
Must find some way of doing away with the spots by treating solution, therefore I went back to old speed and treated sol by two ~~electrodes~~ electrodes 2 min at 800 MA. this did not improve plate very much

Jan 27-06

285 - Treated with carbon electrodes again 4 min @ 5 amps. This seemed to improve it some.
Plated 15 min @ 400 M.A.

286 Treated with carbon electrodes again and plated 15 min at 400 ma. This was very much better but still not fine

287 Now using a solution which Greenly made up. This gives a fine deposit like polished steel.
Plated 15 min @ 500 ma. but began to strip before removing from solution

288 Duplicated 287 this plating is fine.
I notice that all of our antimony plating is very easily removed from our copper cylinders evidently as

have got to find some thing to that will be more adherent for antimony.
When a Cu drum is plated with this antimony it will on standing begin to crack and peel. Evidently this is the eutectic variety.

289 Plated silver drum 110 min @ 500 ma
This has a fine polished steel looking surface

Jan 28-06

290 - Used antimony silver drum
Plated Cu 15 sec at 6 amps
then 2 min at 12 amps
Plated 7 coats then stripped
came off perfectly but
most all of the antimony
came off with it.

Tried 4 times to plate
antimony on silver but
was unable to plate it
more than 15 minutes at
6 amps after that it began
to peel.

Took the solution of Sb_2S_3 ~~and~~ dissolved in K_2S

Jan 29-06

Took Co plated drum and graphited it and plated $CuCo$ as usual.

1st series of plating came off perfectly

2nd series of plating came off pretty good

Examined drum surface under micro and found it very rough

Nickel plated another drum 1 hr at 4 amps then polished and graphited

1st series stripped fine

~~Plated~~ 2nd series without treating drum again

Dally is plating with 2 nickel drums grafitted, it catches up spots now & then but easily fixed — This is due to holes in the drum — 10 pm has 3 shots off — 10 ply — Hereafter he makes 7 ply —

No made 111.

There is 1 drum that had at top end this invariably tears there showing plainly that we must have drums with no checks, deep scratches or holes — All that the plumbago does is to fill tray & holes = Buffed drum wheel

I notice since we use plumbago there is no dirt or stuff between layers & also on the drum itself because the holes etc that held liquid are closed by graphite & oil

Assuming that the Cobalt bath runs ½ day (10) 5 hours between each Carbon Anodizing then on big Crack one ampere Continuously applied to Carbon Anode will keep bath in good order —

There is a trick in putting on graphite - If you get too much it will peel - if not enough it sticks
What you wanted is to fill the holes & deep scratches & remove all the rest without removing that in the holes
I guess if you fill & then (if it is too hard the wants goes down in the holes) wipe graphite out again
What wanted is cloth or Chamois - or a piece of hard leather that will not be springy enough to go down into a hole

Notebook, N-05-12-04.1

This notebook contains dated entries from September and December of an unidentified year, probably 1905. All entries are by Edison and relate to the technical development of his storage battery. Included is a log of battery trials noting different compositions of cobalt and nickel flake and experimental methods for loading the flake into the cell pockets. Inserted into the book are several loose pages pertaining to the battery tests, and a one-page note on battery patents. The pages are unnumbered. Approximately 30 pages have been used.

	400			450			
10	392	350	338	367			
12	573	632	636	635	515	522	566	571
13	356	400	396	397			
14	195	200	199	195			
15	192	205	206	208			
16	270	302	320	333			

Nitrates & Chlorides in KOH are bad, in with 1/2 amp in 21% Dec 4th - ~~of~~ dropped down Dec 16th Chloride dropped on 14th Dec - Sheets were good + about 7/10th of 1/10000 thick about 100 mlg of Nitrate K+ Chl K in the H2 Tumblers, arsenic K writ Dec 16 also -

	319	320	321	322	327 Hot			377				
2	586		600	726	646	725	721	725	658	686	700	725
3	646	732	700	739	680	697	730	740	682	700	717	742
4	730	730	740	775	600	698	703	717	625	655	668	660
5	27	20	20	25	37	37	40	42	Co			
6	622	622	648	668	525	610	605	620	548	567	587	592
7	180	228	220	240	221	230	242	227	225	230	242	242
8	555	592	531	670	515	583	592	615	505	550	566	572
9	367	365	306	397	275	330	330	330	241	262	277	269
	554				554	554				Stoke		
10	645	702	730	753	Nitr.	587	658	687	696	423	500	
11	243	277	250	250	Co							
12	787	825	838	850		820	832	832	836	660	732	
13	457	502	505	553		442	482	450	486	375	425	
14	550	618	651	675		567	606	625	635	352	375	
15	237	246	250	262		227	244	250	246	195	220	
16	420	452	476	486		372	405	417	426	295	345	

	381	382	427			477	527				
2	700	712	561	647	683	572	382	420	426	447	
3	710	720	620	620	722	652	534	572	590	600	
4	652	658	530	623	648	632	525	580	587	587	
6	572	582	470	537	579	549	452	499	498	510	
7	231	234	165	219	222	220	178	200	202	202	
8	557	572	402	447	520	482	375	425	415	426	
9	272	280	211	247	249	245	210	220	219	215	

A perfect
B Little open
C completely open
D Barely opened

for seam opening Sept 26

Mol. Stiff
Mol
Very stiff Mol
"
"
"
"
"
Caramel
" Thin
Thin 1/2 portion Caramel
Caramel Thicker
Rolled wrin
" KOH,

20 Temp. Much thicker Caramel
30 "
75 "
100 "
Punched removed plunger
Thin 50 on 120 Stiff Caramel

Stop

	9	50	100	150	200	250	300	350	400
A 25X	794	776	827	767	753	733	596	530	450
A 26 X	740	777	812	768	781	796	785	758	706
B 27	699	767	712	700	621	582	440	415	
A 28	735	767	793	770	803	757	710	665	602
29	836	745	622	492	461	377			
B 30	932	937	894	877	890	853	617	507	
B 31	875	903	875	881	900	752	655	522	
B 32	920	867	903	838	907	887	640	530	416
B 33	838		853	840	853	838	706	67	506
A 34	715	800	777	782	800	770	715	618	422
A 35	745	791	785	772	867	795	796	722	650
A 36	731	696	600	582					
B 37	787	750	665	600	547	Co			
A 38	796	506	306	28					
A 39	587	750	672	67					
A 40	780	657	654	618					
C 41	809	860	815	816	812	798	650	572	435
A 42	819	735	575	492					
43									
44									
A 45	710	782	717	792	770	750	665	572	447
46	850	776	590						
A 47	808	776	590	496					
48									
49									

	2K	50	100	150	200	
A 50	492	550	497	460		
A 51	519	500	404	283		"
A 52	590	592	406	330		
A 53	600	687	620	611		A
A 54	717	787	725	740		
A 55	750	842	760	792	817	
A 56	750	287	225	345		
A 57	832	855	717	608	530	CO
A 58	783	695	570	446		
A 59	795	862	843	832		
A 60	796	794	787	830		
A 61	798	445	471	330		
A 62	797	461	500	CO		
A 63	857	870	862	907		
64	833	890	~~662~~	Cut out		
A 65	834	904	590	915		
A 66	805	832	825	805		
B 67	777	532	610	445		
A 68	818	445	477	CO		
A 69	763	812	810	845		
A 70	762	810	797	795		
A 71	745	657	715	680		
72	650	745		Cut out		
A 73	500	217	167	CO		
A 74	662	400	287	CO		

1130 Staff Command

1500 "

1800 "

2000 "

Staff Command 50 Troops,

"

"

Have 50 rifle pieces in = Thus setting day Staff Command,

Nickerson Staff Command

		50	100	150	200	
Three 80 all from the stuff Commercial. A 75	836	640	510	Co		
A 76	836	830	842	830	573	
B 77	830	767	707	640	500	
A 78	825	835	765	765	672	Co
A 79	782	717	543	Co		
80	500	800	675	698	Co	
Thin glucose A 81	799	765	660	Co		
A 82	798	665	527	Co		
A 83	772	822	820	842	777	
2nd strong glucose A 84	799	702	590	Co	Co	
A 85	815	918	880	911	660	
86	812	650	550	550	Co	
2nd strong glucose A 87	824	747	575	582	Co	
A 88	772	635	525	Co		
B 89	840	867	857	875	815	
Gum Dextrin A 90	877	642	532	Co		
91	882	662	476	Co	Co	
A 92	861	541	487	Co		
Rosin soap A 93	934	917	887	777	662	Co
A 94	902	710	533	Co		
B 95	919	709	536	Co		
Rosin soap with 2nd wash A 96	848	840	785	682	545	Co
A 97	845	778	621	Co		
A 98	850	770	627	Co		

			50	100	150	200	
Thursday Room Soap	B 99	962	510	460	Co		
	B 100	917	531	400	Co		
	A 101	886	605	462	Co		
Room Soap Wed 2 days	A 102	905	662	575	Co		
	A 103	910	625	493	Co		
	A 104	907	760	650	Co		
Open neck line 200 Quite thin Room Soap Wed 2 days	A 105	892	592	500	Co		
	A 106	895	628	565	Co		
	A 107	907	753	733	675	641	Co
Thicker Room Soap Wed 2 days	A 108	870	856	885	915	765	
	B 109	877	778	696	602	550	Co
	A 110	865	843	850	760	671	Co
Powdered K Sulfate	A 111	497	408	385	Co		
	A 112	525	400	353	"		
	A 113	512	470	463	"		
Wed 2 days Nickel plate Shift Resin	A 114	773	595	402	"		
	A 115	801	700	632	"		
	A 116	800	553	352	"		
Mohawk not sticky	A 117	923	903	768	652	492	Co
	B 118	892	626	478	Co		
	B 119	930	617	495	"		
glycerine	B 120	877	618	535	"		
	A 121	857	643	650	"		
	A 122	832	542	480	"		

		7th	50	100	150	200	
very stiff medium	C 123	855	745	x	Co		
	B 124	877	691	611	"		
	C 125	878	687	597	"		
very stiff med	A 126	732	657	662	"		
	A 127	766	581	517	"		
	C 128	767	655	645	"		
very stiff med.	C 129	912	745	596	"		
	C 130	885	811	777	722	612	Co
	C 131	906	782	707	670	525	Co
very stiff med. black bitty coefficients	B 132	835	575	492	Co		
	A 133	785	627	537	"		
	A 134	835	617	510	"		
very stiff spheroid	B 135	900	937	865	900	775	Co
	B 136	906	747	588	Co		
	A 137	902	697	550	"		
	138	x					
	139	x					
spheroid stiff Balls	A 140	941	872	843	868	813	
	A 141	927	910	880	950	917	
	A 142	897	662	573	Co		
medium stiff spheroid no balls	A 143	997	790	665	Co		
	A 144	941	797	725	700	592	Co
	A 145	953	785	750	692	633	Co
	146	927	592		Cut	Out	
black flecks, stiff medium 1/2 in Co 1/2 in spheroid	B 147	880	820	863	847	652	Co
	A 148	872	640	450	Co		

		50	100	150	200		
very stiff mat. no balls	D 149	898	840	815	760	747	
	C 150	862	715	613	Co		
	C 151	876	840	726	690	550	Co
stiff mat.	A 152	881	817	812	807	710	
	A 153	878	735	581	Co		
	A 154	870	927	845	960	857	
Stiff mat.	C 155	840	737	637	Co	Cut Out	
	D 156	907	762	690	"	"	
	C 157	857	662	555	"	"	
Stiff mat. ½ flocks stuck ½ mixed	B 158	847	785	732	750	667	Co
	A 159	911	765	720	645	553	Co
	A 160	885	865	867	953	937	
3 gram flocks — Stiff mat. no balls 10 mesh mat. of	161	863	700	592	Cut Out		
	162	866	477	521		"	
	D 163	825	647	671		"	
4 gram flocks	A 164	828	557	498		"	
	A 165	863	661	568		"	
	C 166	835	605	421		"	
5 gram flocks	C 167	830	685	595		"	
	B 168	881	757	702	700	652	Co
	B 169	847	710	595	Cut Out		
7 gram flocks	A 170	832	713	580		"	
	B 171	858	628	667		"	
	C 172	895	670	505		"	

6 grms Co Mufflers 2 grms Mu flerlet

glucose, fluffy Mechie flerlet = 3 grms

Improvement of Mi flerlet = 4 grms

still longer grounding Mu flerlet, 5 grms

still longer grounding Mu flerlet 6 grms

Mu flerlet 7 grms

		50	100	150	200	
B173	832	800	776	800	747	
B174	825	747	547	Cut Out		
C175	827	612	620	"		
D176	87	665	300	"		
C177	777	725	646	"		
D178	759	761	790	755	517	Co
D179	792	773	816	842	620	Co
B188	745	637	492	Cut Out		
C181	775	681	568	"		
C182	750	715	665	"		
B183	735	662	548	"		
C184	747	625	517	"		
C185	705	726	723	708	512	Co
C186	737	681	601	Cut Out		
B187	725	720	692	"		
C188	735	790	825	908	920	
A189	697	747	750	812	630	Co
B190	715	740	655	Cut Co		Co
B191	766	778	750	782	657	Co
C192	762	710	564	Cut		
B193	780	800	860	892	915	
194						
195						
196						
197						

100 Tamps Nickel flake

50 " "

50 Tamps 3 lbs Nickel flake

50 Tamps 4 lbs Nickel flake

		50	100	
A 198	1008	932	793	
C 199	968	753	543	Co
B 200	982	920	786	
A 201	710	605	585	Co
A 202	665	685	579	Co
A 203	662	490	460	Co
B 204	695	550	480	Co
A 205	676	687	650	Co
A 206	645	617	557	Co
D 207	1012	752	783	
D 208	962	586	562	Co
D 209	877	682	560	Co
D 210	1005	945	912	
C 211	987	920	910	
D 212	990	925	915	
D 213	1077	1020	585	
C 214	1051	617	316	
D 215	1067	781	316	
D 216	827	800	765	
D 217	807	665	540	
C 218	786	777	575	
C 219	803	780	872	
D 220	806	445	325	
D 221	763	732	832	

		50	100	150	
222					
223					
224					
B 225	727	747	790		
A 226	717	737	793		
C 227	717	700	725		
D 228	735	760	795		
D 229	724	762	765		
B 230	703	760	786		
D 231	762	665	740		
B 232	65	642	652		
B 233	592	720	782		
A 234	790	840	852		
B 235	744	815	837		
B 236	763	855	880		
237	761				
238	722				
239	736				
B 240	780	752	630	570	
D 241	770	811	860	820	
D 242	780	672	575		
D 243	820	768	697	512	
D 244	812	837	886	850	
D 245	792	630	537		

Cold ~~bestowing~~

Taking those starting in 600 Columns ending Sero
~~[illegible]~~ 14 A 3 B showing very little thickening
to overall of low Capacity tubes —

3yl. — pieces matrix 4.48 gram

Double Shell cover — Pale Black Milky glass Sero glass

Double Shell Cover — Milk — Sero glass

" Same " Sero glass Milk Thick

Double T — Cloudy Cover — Non Green Milky poor Clear glass — Sero Glass

" " Sero Glass

		50	100		
D246	867	891	936	882	
D247	802	718	558	310	
C248	797	825	813	707	
D249	972	750	592	242	
D250	972	971	1015	967	
251	997	736	696		
252	920	853	673		
253	808	712	547		
254	903	907	880		
255	945	886	737		
256	932	661	Co		
D257	936	806	677		
D258	892	502	Co		
D259	890	727	Co		
260	900	905	920		
261	772	750	608		
262	853	800	700		
263	860	725	591		
264	892	857	865		
265	921	937	988		
266	901	895	841		
267	879	885	816		
268	902	508	Co		
269	897	900	912		

from McCo flake Burns inside.

McCo poor flake burns outside

Co — Needle good flake Burns outside

Co — Needle good flake Burns inside

Cooke poor flake Burns outside Must dried on hot plate.
Was well made tube.

" ~~Needle good flake~~ Burns inside. * was not dried before

269½	941	50				
270						
271						
272	982					
273	917					
274	941					
275	760	848				
276	752	771				
277	745	660				
278	942	982				
279	917	958				
280	953	976				
281	932	912				
282	925	972				
283	907	750				
284	622	660				
285	618	728				
286	623	722				
287	938	946				
288	971	972				
289	937	917				
290						
291						
292						
293						
294						
295						

50

296					
297					
298					
299	925	721			
300	883	891			
301	905	892			
302					
303					
304					
305	753				
306	725				
307	757				
308	752	770			
309	770	847			
310	770	845			
311	798	892			
312	793	785			
313	795	890			
314	803	907			
315	800	787			
316	797	655			
317	796	677			
318	762	842			
319	777	817			

		50 or more left
320	751	
321	750	
322	742	
323	827	923
324	835	857
325	825	942
326	X	
327	863	922
328	785	633
329	920	927
330	883	941
331	882	656
332	968	955
333	970	917
334	995	958
335	961	906
336	937	900
337	945	767
338	891	915
339	893	917
340	908	925
341	965	735
342	927	865
343	951	932

Cause why one of a group of 3, go 6a) on hot test –

1st All binder not eliminated, or decomposed inside during elimination + stays on contacts

2nd Swelling at seams while apparently the same may in one case cause surface of tube to leave the mix over considerable area, whereas in other cases it does not leave.

3 Heat with green + closes pores too much There may be something in this because when cells come off hot test they always run 15 to 25% better on 3rd run – possibly due to embrittlement + increased circulation This is just the opposite on cold test

4 Inside mix gets full of some reducing agent + MnO_2 can't form –

5 on heat mix expands but running cold contracts – more in one tube than another owing to different deformation of the tube,

6th Holes being packed rather tight gets plugged with muck.

7 Iron dissolves also Hg more in one cell than another due to Si organic matter etc.

8 - Something in KOH causes flake to be attached more in one cell than other

9 According to how mix expands, flake pulls apart.

10 Flake gets amalgamated + Eaten by Hg dissolving in the KOH.

11 Chlorides Nitrates etc attack flake

12 Dehydration of mix by heat + conc KOH,

13 - Cells on test one gets 10 or 15 higher temp than others -

14 Some cells not soaked as long in KOH before first charge as others

15 Low water allowed on some cells dries + gets mounted with silica made insoluble thereafter -

24 1st (tubes good)
11 2nd "
15 3rd "

16 = Segregation of green in mfg tubes

17 - Unequal distribution of mix on sides of tube in loading makes seam pull out different,

18 Sticks in mix - balls up more balls in last parts mix by segregation.

19 - flake attached, black oxide formed on flake which is non conductor, something in KOH originally or from something dissolved out of iron increasing oxidation, or Nitrates, chlorides etc.

20 - Possibly the forming or 1st charging (cold) has something to do with it notice the cold group used for leaking which afterwards burnt on hot so all 3 are good —

21 - perhaps every tube is not set right under tamping tools so some get a heavier tamp -

22 Notice in a group one will have 400 mfg more or less active material than the other mfg —

[ITEM FOUND IN BOOK]

Dyes –
in Tube pilot
Speak about not drying mix
but use moist to permit flo
& no seg'n Elé
+ Claim a viscous Lubricant to
flake + get more in –

[ITEM FOUND IN BOOK]

1. Not due to ousthing of pocket
2. " Packing
3. " Stake
4. " Smoking out binder
5. " To original way of mixing or quality or quantity of binder

1st Due to difference in plating the tube
2. " in the twin hole operations
3. " Smothing with OH causing excessive swelling or Hg Pockets
4. " Uniquent heating on stabling
5. " Soft ends allowing tube to expand when cement flow
6. " Smothing in rubber brought out by heat
7. " Circulation within tube
8. " Much deposited or chem change at mouth of burn on wire
9. " Drawing out greasy washing agent tends with on
10. " Not having soft end so wire does expand
11. " Bad Brand
12. " Loose plug or Dripping of Carefully

[ITEM FOUND IN BOOK]

A First. 50 lb. Caramel stiff –
A First + Third – stiff Caramel rather Dry
A First " wt 2 ½ lbs 53 T
A First " 2 lbs –
A Second thin Caramel – No 2 8000 –
A Third thin glucose 8000
A Second thin "
A First + Third Thick Room Temp. sticky no balls –
B First glucose stiff Balls – Covers ok
A First + Second " " Hot Energy brake – Covers OK
B Second glucose Covers – ~~stiff~~ not sticky – Mix of Coll + Muffle
D First Very stiff Mol no balls thin 20 on 200 – Covers Mol
152 AA First + 3rd Mol stiff metallicky Covers OK –
160 A – Big flake 10 m
179 D glucose very sticky pliy too sticky fine balls –

[ITEM FOUND IN BOOK]

(Very bad ones all bad) —

72 — Ni flake —

90 Quin Dublin

99 Thin Rosin — green all from 80 all fumes in

102 — " " green Tint, Dry air

111 R Sulphate (Mg SO4) 600 m thick rosin 80 all fumes in

114 Mechel flake Stiff Rosin — poor coloured (broken flake — up — zigzag)

120 Glycerine —

123 Thin 40 on 200, stiff mech-flake very black thin — Coarse OK

126 Mechel flake — stiff Mch large of green thin 40 on 200.

132 30 on 200 — black Mch-flake Very stiff mch Coarse coll.

155 30 on 200 Thin Mch big flake Mch, perfect (reserve)

161 " " 8800 g 500 stiff mch 3000 flake No Coarse perfect 3.96 green

4000 " " 3.82 "

164 " " " 7000 " " 3.61 "

170 " " " 500 stiff mch 5000 very fluffy Mechelf — bally 3.59

182 " " " 500 stiff mch 5000 very fluffy Mechelf — bally 3.59

[ITEM FOUND IN BOOK]

1st Cause of low cap on 1st runs — Glucose not washed out,
2 " Swelling weak joints.
3 " Losing cap 1st flake too thin — 2nd too much flake with swell closes pressly —
3rd swell under certain conditions breaks contact with packet, 4th gradually
changes in the Carbon left in by Glucose working it more porous or Gas an
insulator — 4th Drift breaks, 5th something in Trans that affects
surface of flake, 6th Something in ROH, that affects surface of flake,
7 No place to expand — 8 Expansion breaks flake, 9th Bad plating on Trans
10th Degregation of mix — 11th not well soaked in 2.1.1 same time 60 for
going on charge — 12th different Temp that they are run at
13 Water allowed get low in going 14 Tells not put on proper
line when get low & get neversed 15 —

[ITEM FOUND IN BOOK]

all bad

72 thru 80 fair well — 4000 Nickel f. 4000 Ni 3 Cornell 50 T
90 " " 6000 Cu f. 6000 quite [illegible] green not Cor well — 50 T.
99 " " " 6000 thin Rhem Scrap up all green free
102 " " " 6000 thin Rhem Scrap [illegible] very so any — green tint, pinholes not Cor
" " " green tint, pinholes only thick Tc flake 50 T. are dried
109 all thru 200 — " " 6000 Nickel f. 6000 Rhem scrap green tint. Covering fair 50 T
111 thru 50 all fine — " 6000 Nickel flake 6000 Rhem scrap — green pin Cor 50 T [illegible]) are dried
114 " " " 6000 Nickel 6000 glycerine green
120 " " 6000 Nickel 6000 very stiff wet. Cor perfect. flake very dark red.
123 thru 40 on 200 6000 " 6000 very stiff wet. Cor perfect. flake very dark red.
" " " Tinge green - covers fine — but flake poly thicker than Nic -
126 — " 6000 Nickel f. " " " Tinge green - covers fine — but flake poly thicker than Nic -
132 thru 30 on 200 6000 Nickel 4000 thy stiff wet. cor fairly well —
155 " 6000 Nickel flake Cu f. 4000 thy stiff wet. cor fairly well —
161 " 3000 " 10 " 5000 " Covers perfect - thick dark flakes well in tubes
164 " 4000 " " " " " " " "
167 " 5000 " " " " " " " "
170 — " 7000 " " " " " " " "
182 " 5000 Nickel f. 5000 glue Cover ok — Cole
201 " 6000 " " " " flake broke up 100 T
204 " 6000 " " " " " " " " 50 T
207 " 6000 Ni Cu flake dirty 6000 Cu Ni f. Cor perfect. juicy —
213 " 6000. " flake 5000 glue Rim on 330% —

33 bad tubes Cor perfect
24 " " Covering not perfect green

[ITEM FOUND IN BOOK]

3 good all glucose
4

2 good
caramel glucose mol
1 ||||| ||

8

1 good 1 fair — caramel Rosin mol glu
1 1 1 1
4

1 good Caramel glucose mol KOH
|||| ||||| || |
14

1 pretty good Rosin mol glucose
|| |||| 12 15 3 21 3 1 ///

90 — ~~63~~ glucose
~~21~~ Caramel
~~39~~ mol.
~~18~~ Rosin
~~6~~ KOH
~~9~~ glycerine
~~3~~ Dextrin

All Good Mol glucose Caramel Rosin Amalac Dextrin glycerine
|||| |||| 1 ||||| 1 1
|||| 3 3
~~24~~ 12 3 15 KOH
1
3

[ITEM FOUND IN BOOK]

[ON BACK OF PRECEDING PAGE]

1 good

60
66
75
78
81
84
87
135
146
173
179
240
243
249

1 good 1 fair

69
108
158
216

3 good

210
225
228
234

two good

63
140
152
188
191
219
231
246

all bad

72
90
99
102
105
111
114
120
123
126
132
153
161
164
167
170
182
201
204
207
213

1 partly good

93
96
117
129
143
149
176
185
198

[ITEM FOUND IN BOOK]

3 good –

210 – Thos Jo on 200 Good McCoy stiffly Fine glossy, no bubbles, So Double T Cover
221 – Good McCoffish stiffly Fine glossy Dark no bubbles, Fine (for wide) no cracks yet crack yet So T
228 Thos Jo on 200 Good stiffish bubbles McCo Fine glossy Fine (for wide) no cracks yet crack yet So T
234 Thos Jo on 200 Good McCo stiff Fine glossy Fine (for wide) no cracks yet crack

2 good

63 Thos Jo stiff Good McCoffish Very dry So T
140 Thos Jo on 200 Good McCo bubbly flecks black Fine gloss, bubbles Cov ok So T
152 Thos Jo on 200 Good stiff not Good McCo Thos Jo 15 mark - not stiffly stiff Cover perfect
188 Thos Jo on 200 Fine flecks McCoff So T Fine gloss bubbles Small black Cover ok
191 " Good bubbly Mcoff Thos Jo 15 Fine stiff Mcoff not stiffly - dry bubbles no bubbles perfect Cov
219 Thos Jo on 200 Good bubbly McCoff Fine gloss Stiffly flecks cracks flecks cracks yet So T Cover
231 " Good bubbly black McCoffish Fine gloss no bubbles Very cracks yellow cracks yellow cracks yellow So T
248 Good McCo flecks very bubbles black stiffly Cov perfect Fine gloss 100 T stiff not

1 good 1 fair –

69 Thos Jo stiff Good McCoffish Thos Jo Good 3 Comment So T 2 Cov not
108 " " Good Co McCoffish Thos Jo Good Thos Jo Fine gloss Cov not Cov not Comment T
158 Thos Jo on 200 Good stiff not Good McCo not Cracks Yellow Thos Jo bubbles
216 " Good McCoff Fine bubbles Fine gloss So T

1 good

60 Thos Jo not Good McCo flecks McCo 20 m. Cov ok stiffly Good Comment
66 " " Good Comment So T 25 cc
75 " " Good Comment So T
78 " Good McCo. Thos Jo 200 mark Not Cracks - Grade No 2 Comment
81 " Good McCoff Good Fine gloss, pockets not Cracks yet, bubbles
84 " " Good " " stiffly not Stiffly
87 " " Good " " not Comment
135 Thos Jo on 200 Good Fine gloss very stiff, bubbles Cov ok So T Good McCoff
146 " Good Fine not Good McCoffish, bubbles Not Cracks Fine stiff not So T Cov ok
173 Thos Jo on 200 Good McCoffish not stiff not Good Not Cracks Cov perfect
179 " Good gloss Fine flecks McCoffish not Good Cov perfect
240 " Good gloss McCo flecks flecks over Cov ok 100 T bubbles - Cov ok So Double T
243 " Good gloss Good McCo
249 " Good 25% Kott. Cov perfect 100 T 4 Wrapper

1 partly good

93 Thos Jo stiff Good McCoff Good Fine Cov ok So T
96 " " " " direction mark not perfect Cover
117 Thos Jo on 200 Good McCoff Good Cracks not, not well cover not stiff not stiffly
129 [redacted] Fine very stiff not Cov perfect very stiffly
143 Thos Jo on 200 Good McCoff black Fine gloss Thos Jo not cov well
149 Thos Jo on 200 Good very stiff not Good McCo Fine bubbles Cov perfect not perfect stiffly
176 Thos Jo on 200 Good Fine McCoff bubbly Thos Jo Fine gloss Small black very Cov perfect
185 " " Good " " " " "
198 " " Good McCoff small bubbly Fine stiff not 100 T

[ITEM FOUND IN BOOK]

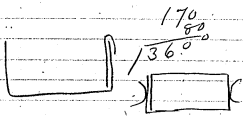
Effect of Binder —

	all good	2 good	1 good 1 fair	1 good	1 pretty good	all bad
63 Glucose	12	~~15~~	3	21	9	12
21 Caramel		3	3	12	0	3
39 Mol		6	3	6	12	24
18 Rosin		0	3	0	6	15
6 KOH			~~3~~	3	0	3
3 Glycerine						3
3 Nitrin						3

100 % of all good
62 % of 2 good
25 % of 1 " fair
50 % of 1 good
30 % of 1 pretty good
19 % of all bad

Notebook, N-05-11-25

The only dated entry in this notebook is from November 1905. All entries are by Edison. Included is a list of things to do regarding the preparation of a "new model battery" using cobalt flake and a tube-based, rather than pocket-based, design. There is also a set of descriptions of nickel and cobalt ore sources. Near the end of the book is a series of phrases that may represent ideas for an advertising campaign for the phonograph. The front cover is labeled "New flake Co Tubes— Record." The pages are unnumbered. Approximately 30 pages have been used.



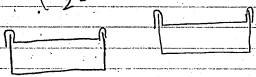
170
200
340 watts.

270
61

2700
2440
2600

44

100
44
56



25

470) 746 (1587
470
2750
2350
4160
3400

362
130
1086
362
47016

1.587
16
9522
1587
25.392

362 - 446) 1310 (3. lb -
338

16 lb

12.5
30
15

3.200) 800.00 (250 mapergm.
64
1600
1600

1250
288
10200
10200
2500
362200

5

250
5
1250
288
10000
10000
1550
1250
2850

288
18
2304
288
5184

144

50
3.2
1.8

4

151.2

55 —

144
55
720
720
7920

792
518
1310

3|567
189
756
492
151
2
145
6804
56
15
2
145

Nov 25 1905

New set of experiments as final round up of new model battery with tubes and Cobalt flake

1 – Fuse 3 neg Tubes [that were down to 600 in a good group] of KOH. Then dip + dry twice or 3 times in Conc NH_4 + Carb NH_4 of Nickel hydroxide, dry + put on hot test to see if $Ni(OH)_2$ has shrunk –

2 Take some of the good large sheet Cobalt films make 6 cells 3 to 6 run hot 3 cold use Ni strips, fred Ott to make –

3. Same as 2 but run cold continuously anode in KOH made in different ways.
(1a) Electrolytically – from Sulphate also from Sulphate by $BaCarb$ etc – also Electrolytic $NaOH$, + from Sulphate + $BaCo_3$

4 Doctor to analyze our KOH. test
Especially for Arsenic, KCy - I - Al

√5. Test now [that have been run with tubes having Co flake] for Cobalt,

6. Try hot test 3 cells with sheet Co
in KOH having 25 mlg KCy to cell.

7 = Make 15 flat cups filled with Co flake
made with Copper on big drum &
punched, 3 to be anode continuously
cold 3 continuously Hot, 3 charge-discharge
3 continuously reversed hot the last
with irons,

8 - When get new flake make set 5 with
50 increments a dab of green then Tamp
then dab flake then Tamp & so on
also with 75 increments

9 = Make group 5 tubes using same proportion glucose as in No 2 + 3.
Idea being minimum binder, ~~Fro~~

10 - Make group of 5 with rings soak out 3 days minimum heat in faint alkaline water then soak 75 hours 33% KOH before charging

11 Put in glass cells 2 of each of following good Co sheet flake KOH, Containing in each 100 cc 50 mlg KCl — $KClO_3$ — ~~Ⅱ~~ KI. SbS, Sb_2O_5 of IK — KS
Continuously use as anode - do this — Chem Room — Clean out the glass cases Prof O.C. to do it -

12 Split 3 of group which have long but second 1 of which is good — note flake etc — dissolve by KCy all — note flake by weight from all 3 —

13- see if Nickel Nitrate comes to a group is sticky Enough to stick flake Co To Ni RHh

14= Cut Composite Cu Co. into strips 1/32 X 1/8 inches square mix with Molasses

15 Plate strips 1/2 of thousandth Cobalt, for tests also with Nickel to see which best,

16= Use platinum dish & electrolize our Reg RHh, & have the Doctor assay the deposit qualitively on both Anode & Cathode,

17= Test Co plate in large sheet before & after Hydrogen & see which lasts longest in RHh, 1/2 amp To inch -

18 Doctor to assay our Iron, Ni, & RHh,

19= Pack tubes with round convex plunger also Concave - also close fitting flat plunger + 2 or 3 orgs smaller diameter -

20 - Use tube nickel plated, also Cobalt plated

21= Try 5 good new tubes with none that have been previously used + that have probably been fired from detonators dubolimeds -

22 Initial charge 5 cells say 10 hours rest 12 hours charge again 10 hours 1/2 density - do this twice The idea is to build up MO_2 to maximum before discharg so there may be mechanical cracking off the green otherwise + total separation + out of Contact,

23= Do the above also in 33% NaOH + finally soak out a week in KOH before Use.

24 - If it takes a week for green to develop maximum capacity - try 5 tubes soaked week in 27% KOH, before changing

25 See if running of tubes is hurt by acetone, this dissolves HgO - & if it hurts tubes see if the Iron or Ni

26 - Test with new Copper Hg Iron to make sure Copper does not affect the Cobalt flake -

27 - Corrugate 5 good tubes to make sure this is not necessary

28 Run 3 tubes with Reg graphite mix Cobalt & find out why they don't give capacity they should - probably by the expert Can find out nature of trouble with Co flake tubes -

29 = Make tubes green all Through
15 20 30 + 40 mesh — with flake
thru 20 mesh —

30 - Try some thin Cobalt sheet flake in
KOH, in which there is an agent which
dissolves Hg - Acetone etc, see if
life of flake is shortened,

31 = As all the 3 tubes of a group on
starting Cold + for many runs after one
all good + up to capacity even up to
150 runs in fact improve, and even on
50 additional hot runs are good &
then go bad or one goes bad on the
next run of 50 hot, shows that the
Contacts of flake of cold run is good,
+ will keep good that the loss of
capacity is due to the effects of
heat and that with same tubes
made alike same flake etc the effect
of heat is different + places the
trouble either to separation of tubes
or to the effect of heat on some
dissolving ingredient which effects
the flake + the chances are that

31. The trouble is due to something in the KOH, in the rubber or most likely in the iron — or iron itself, which solubility depends on impurities in the KOH. As graphite pockets of a group contain such great variation as to flake - but all go bad together & Ni is more so good as Cobalt. That it is something which affects the flake & varies in the different cells. ~~[illegible]~~. Could be Silica in KOH causing dissolving of the iron, or flake, Aluminium, Hg - Organic matter, Acid radicals - Cu, Pb etc reduced by H2O, NH3 Oxides from rubber impurities, Manganese rather likely in the iron possibly the whole trouble is due to oxidation of the flake, the one of the group that goes bad so that the tube swelling allows the diffused permit more electrolyte to reach the flake between tube & mix & thus oxidizes the important flake which remains Contact with mix & tube -

32 = Makesome Ni Cu flake, perhaps reason Ni works bad, there is Zinc in it =

33 Try Bromine in $CoCl_2$ bath for plating also in Cu bath, in place Chlorine, - in Case can't get chemicals free of iron etc —

34 It now seems probable that the reason Nos 2 3 4 etc 30 31 He have given more permanent results on hot test Especially No 3 is that it was Cobalt + the flake was made with a single plating + was thick also well covered — The flake produced by one plating on Zinc must have been far tougher + more difficult to attack that that ~~Tube~~ original got by Warren on the Beryllium that being far more porous Eaten by acids + full of Zinc + thinner

35 All new test cells to be soaked in Nickel plated cells not glass with only few drops KOH to get rid of silica getting under tubes & Chromium on the flake & pocket which it dissolves within the pockets soaked long time had in 33 or 34 plate,

36 = Get good supply of ~~[illegible]~~ Hank Or test test for acid etc & wash organic matter,

37 = Previous to use wet the green & let it remain wet for 2 or 3 days, or perhaps what is better spread out a flat under bell jar would it until it takes up maximum H2O – The make a mix & group –

38 - Same as above but soaked in water 2 days –

39 = It may be that the time between the mixing & putting in tubes + exposure to air during the glycerine or its absorption by the grain before Tamping profoundly affects its lubricating qualities + explains changes between groups made apparently the same —

40 = 1 group colored be given a varying charge, charging 12 off 12 hours than on 12 + so on the buildup the given to a Conductor = The next Gang to reason be the KOff lost by Charging

41 - Don't forget pack group with rings made slightly larger + put on load after packing to allow Mat to Expand —

42 = Top some thro 15 all fines in
also thro 15 on 80 —

43 = Mountain green with some Ammonia with
sulphuric in to make it blue then coat with
Recovered graphite & made it just like
green with Cobalt of Calc — thro 40 all
fine in —

44 = perhaps pkg by machines make
a big rind of and thro perforations
& separates of blows flake, whereas
hand pkg cut — Hand pack &
machine pack a single mix 3 in
inch group —

45 as No 2 3 4 etc tubes ~~were~~ had
flake made by single layer
upto 35 or thereabout & all after
were several layers of Zn Co,
possibly flake free Zinc or less
homogeneous — New flake ought
to be good as slow good like 2 + 3
+ 4 Ni —

46 = ~~[illegible]~~ group thoroughly soaked water (18) green – then used Kerosene or foam finder – This prevents bubbles going in green – dissolves out by Benzol etc [illegible] then alcohol hot ~~[illegible]~~ !

47 = Moulder green with KCl_3 to make strictly by dissolving detum + use flocks,

48 = After group made dry in KCl_3 dry + put soak in 2(%) to soak hot KCl_3.

49 = add to glucose some KCl_3 to act as a solvent of green surface

50 Paint chemicals on air now – test Hg – KOH – bad rubber mail [illegible]

51 = ~~Take~~ group same my
one group Nickel plated pkt.
one Cobalt plated one
Nickel plated over this Cobalt,

52 = Try some 1/8th of 1/100 also
1/4 of 1/100 Co flake - using
842 743 -

53 = Take dissolved Cobalt flake
tube break open KOH modelly
open up + dissolve out
green by KCy a sec amount +
Condition of flake -

54 group 3 each assume in 250 mlg
each cell - of following - Nitrate K
Sulfate K Chloride K Sulphur
100 mlg KCy - Sulfide K -
100 mlg Silica - 100 mlg Alumina -
250 mlg Lime - Barium 50 mlg KI
Manganate K - gelatin,
Hydrocarb, Arsenite, Antimony
OVER.

Iodamm K Borate K – Phos K.
Bromide K – ZincOx – LeadOx –
Copper(OH)$_2$ Ammon KOH, HgCy – KCy
NaCy – KChlorate Nitrite K –

55 = by removing wire from Z tubes +
replacing w/ good Co plated tubes
possibly also something

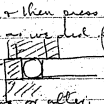
56 – Fred Oth says plating of Cobalt
was better 6 at on tubes in many
cases & thus ended through the curve
non chemists to get + from an insoluble
hydroxide + thus dead on Cathode
possibly thus would explain
all the variations w/ cells
as they don't appear at 195 –

57. It looks as if I have been on the wrong ~~tr~~ track with tubes – while it is very well to pack light sideway, it is more essential to pack light endway, witness the long life of all high corrugating pressure flat plates I have made flat packed with Reg mix grafite – 250 always – they are about as good after 50 hot runs as ~~bef~~ when blanked. Heavy pressure against packed has always been good –

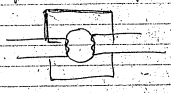
In pkg tubes should use a convex packer

or pack regular – then press or roller Corrugate same as we did first

or press square



spit rings on before or after.



58 = Notice if any of the old Computed tubes have opened –

59 = plate pockets with Co alone – Nickel Co – Co 60 Ni 4 – Ni alone –

60 = make plates with Nickel flake alone – ditto 60 Co 40 Ni –

61 – Make some oval tubes (2) oval some round tubes + rings put in oval die + pack with oval plungers + let them swell round –

62 Order from Synopy Glucose also some more (2) 50 lb Glucose

63 Cooking to make some Cobalt anode by plating in presence of long Chlorine – also Copper in presence Chlorine + very low density + fairly strong acid – then with these anodes + good Sol my flake equipt in mill drum without + then with Chlorine

64 = The reason you won't work in tubes is that the mix shrinks, bad - try a group of 3 charge & discharge them & then compute to press them together

65 = Because try groups after they have soaked in KOH, 21% 24 hours (10) don't change before to allow them to get fully soaked with KOH, remember the old expression, of great length time it took to get a colored chemical out - but have some soak 48 hours & some on 3 or 4 hours -
Say of same mix - 3 soaked
5 hours 3 12 hours 3
24 hours 3 48 hours +
3 96 hours before charging
15 all together -
Empty KOH from all before charging - put in fresh ~~and~~ after charging ~~& [illegible]~~ & slowly till reach maximum
Empty out KOH, & put in fresh put in KOH test

66 = Make another Loader & learn one of the 60 go under Fred Ott,

67 Group green hat s my 220 for 3 or 4 hours against a group that had absorbed Mag water under bell jar in hot place —

68 – Mix 108 green
37 Cobalt flake
30 glucose or less –
This makes 5 groups of 3 each, although it should make 8 groups possibly on account of thickness of flake needs 7 to 3 flake.
Then it mixed 62 108 green
46 Co
30 glucose –

10^{4}
3^{7}
4^{0}
(97^{0})
1^{55}
2^{30}
2^{30}
2^{35}
7^{5}

69 = Feby 23 Entered into run book Tilghman K 250 milg with Ni plated

also gramp with Co & Ni tubes
with 250 milg gelatin — ditto
Cellulose — ditto Oleic acid —
ditto K_2S — Iodide K —
KCl = Sulphate K —
Nitrate K,
Ammonia 1 gm —
gramp. 10% K_2CO_3 10% KOH —

gramp 15% KOH — Ni tubes also Co tubes
gramp. 38% " " "

~~gramp~~

gramp with 4+3 Latten graphite
used just as use flake Co —
Ni & Co tubes —
gramp 250 milg Hg dio in soulthy —
" 250 " Acetone,
" Phosphate Potash, Ni & Co
" Borate " Ni & Co

New South Wales – There is a smelting works at Dapto –
The New Caledonia Coms controlled Nickel mines are to send over their ores have it treated there, see of near Port Macquarie

Deposit of Ni + Co on Lehigh Co Idaho 60 tons shipped as samples therefrom in 1905 nothing ever given it means of obtaining Co which is the Salmon City mine –

Geological Survey US say assay of Slumbered Con Mine in Grant Co Oregon

Si	47.81	CO_2	1.94
S	4.43	Cobalt	6.34
As	20.18	Ni	0.75
Fe_2O_3	17.28	gold	0.017
Al_2O_3	0.12		
CaO	2.88	ag –	0.0028

Some nickel ores from development work on mines in Hemlock Floyd Co Virginia & also near Webster Jackson Co NC.

US Arsenic Mines now wkg Rewald Postoffice Floyd Co Virginia

Write Chief Static Bureau of Mines Denver Colorado if they know anything about Sterling Mining Co Mines Gunnison Co if operated or abandoned

ditto to Utah if he knows of any smelting or producing Mr Butte or Spring centering Cobalt

Manganese ores occur in Bibb Co near Woodstock Ala in iron mines at Stocks mills Cherokee Co Ala -

North Carolina Madison Co near Warm springs -

Arrange to have shipped at
Cost + 20% added ~~500~~
Enough Old Reg mix for 50
Cells daily for next six weeks
& Chemical 100 daily —
Use 10% Hg in Prin —

Order 300 Ton Hydraulic for
Glen Ridge

Order from Bergmann acetylene
Wrecker for 200 cars daily
for Glen Ridge also one
set his new Iron fillers
4½ gram Cake

Furnish Bergman drawings
for filler tube drawer, Electrodes
rings & grid —

Order big Copper drums

design soaking tanks for
flatten RLY also others

John design a good Slicer
also Chopper for big
bldg —

Test little Roaster to make
pyrite magnetic leach
from ott —

Wiley from Cement come to
Orange see Drs Michaud
fumbling unembumed Silica

Put Sands & N J Pat Co
with Carts in my home in
Sofa —

Arrange with Bergmann
get him Cup & Cock of it
cheaper —

John Ott about testing
Chaum now used & making
other Chaums test
against it —

Weber about closing 15 ft
back ends bldg & steam
heat etc so can occupy

Hazel prelim sec of RCy allotted
land with view of using it
for soaking tanks for flake
also Hard Rubber lined

Bergmann about Can
Tools for bending & Corrugating
Rolls

My first appearance.
To " "

Not such a bad world to live in after all.

They saved up a little money.

Their own theatre,

The Triumph of Machinery

Thats last and best investment

Whats the use of living if you
dont get one of these,
(you cant have one)
~~Just as necessary as food~~

The ~~Sound~~ Voice heard round the world,

Sounds from distant lands

Home is not so lonely

~~[illegible]~~
~~[illegible]~~

Better than Money

Just received from the City

~~Their~~ Their first record,

Just what was needed in the home.

Home Theaticals

Thou art so far yet so near

An addition to the home – fireside

They aint worrying

~~We are not going~~

They won't worry any more

The last bit of furniture,

Be it ever so lowly there is no place like home

The Opening of a new world to them

500
30
530.00
75

108
30
37 Cabinet
175

The real thing

Getting what they paid for –
" " wanted – needed.

~~for the~~
Just received from their son in the City

"Appreciative" Appreciation,
and appreciative audiences

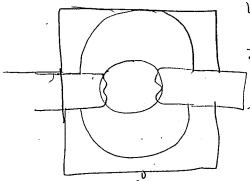
They're are satisfied

They won't get tired of this machine

~~Happy~~ "Machine happy"

Happiness by Machinery

The poor mans home is now a little brighter.



4920 mlg
17
3444
4920
83640

17/1000 of 1%

446 20 / 1000 / 4920
8500
4920

7/175
25

100

108
30 glue
38 Co
175/380(2.6
348
320
176
144

18
6
108

108

18
5
6
29/60(206
58
20
174

108
30
37
175/370(2.1
350
200
18
5
6
29

25

29/50(1.72
29
210
203
30
29

Cobalt 21%
gluem 17%

21
17
62
100

108
46
154/460(3
462

7/109 29/180(62
15.43
3
4629
174
68

Notebook, N-05-08-01

This notebook contains one dated entry for August, with no year given. It was probably used in 1905 or 1906. All entries are by Edison. Most of the book consists of a log of storage battery cell tests. Included are notes regarding which cells used nickel or cobalt, the number of tamps used to pack the metal flake, and whether the cells were run hot (with heated solution) or cold. Near the end of the book are two pages of ore assays. The front cover is labeled "Storage Battery Important Data." The pages are unnumbered. Approximately 40 pages have been used.

						50	100	150	200	250	300	
	350											
Boo R 3	~~772~~				350	812	840	841	827	827	807	791	30 mich all (over in 21000 spoke) water 2 broke then below 3rd Trough 21650 - 35 High adjusted, good for 15 mich 5 - 22.05 ruing before fly 5 - 5 Co
	745				351	803	820	825	816	815	797	777	
	758				352	806	832	837	825	822	812	790	
	833				353	908	927	943	930	932	925	897	21000 - adjusted to 22000 - 45% High 6285 6271 6274 - Good Cylinder Cutter - 30 mich green
354 swollen Cylin - Split seam	730				354	911	945	965	955	942	916	835	
	862				355	880	910	935	912	915	910	897	Co
					356	912	912	886	870	895	882		21000 - Jumped to 21750 - 30 mich green (Lots 4750 gallons) 7% Cutter - ruing on before play - Stick ruing 5944 5926 - 5824 Co
					357	860	880	875	867	868	857		
					358	885	892	892	862	857	837		N1
	732				359	850	860	840	815	812	786	778	Green Thru 30 mich 21000 adjusted to 21743 - good flow 4750 gal ruing on before play 5394 5355 - 5321 Co
	792				360	900	890	887	877	860	840	827	
	845				361	923	917	908	895	895	883	873	Sticky ruing 7% Cutter N1
					362								
					363								
					364								
	770				365	950	945	940	890	882	850	821	Green Thru 40 mich 21000 adjusted to 21690 Cylin good through 3rd mich Boggy then 30 mich ruing on after 6085 5925 5880 Co
	746				366	931	925	915	865	847	815	807	
	750				367	943	917	900	850	832	813	811	
	680				368	898	885	860	807	800	765	748	Copper Ng from reservoir
	721				369	826	835	842	813	815	777	687	21000 adj to 21650 good flow 7% ruing on after play Stick ruing
	755				370	897	885	877	846	837	817	792	5795 5761 5745 Co
	747				371	875	855	865	837	820	813	786	Drop of 325 Cutter Cylinder 7% ruing Stick ruing on before play
	740				372	850	852	850	822	821	807	778	
	715				373	862	867	857	832	815	772	740	5766 5740 5724 Co
	~~751~~												
	~~752~~												
	~~783~~												

	350								
	761								
	760								
	782								
	880								
	865								
	847								
	803								
	812								
	818								
386-300 Rum Swelled a Little	X								
387 " " Split badly	622								
	837								
	767								
	788								
	750								
392-300 mm Split (not seam)									
393 " Seam Split									
395 " Split badly one ring broken									
396 " Split badly									
397 " Swelled & split badly									

		50	100	150	200	250		
374	855	860	867	847	840	828	810	21000 abrd 21620 - gauge
375	866	877	878	850	853	827	792	Rings on after pkg
376	902	882	887	870	862	842	820	5900 5893 5899
377	925	920	917	903	910	900	891	Ring of 885 except 1st broken
378	915	925	896	882	890	885	880	21000 abrd to 21665
379	935	917	907	892	892	883	872	5899 5882 5885
380	850	886	907	687				Corrugated - rings on before pkg
381	900	900	882	535				Cut out rings broken on
382	882	900	882	626				Corrugated.
383	883	895	888	882	870	860	845	21000 abrd to 21610
384	877	896	888	885	870	878	860	3500 glucose
385	883	896	900	892	882	880	887	gauge faulty - Co Lids - very sticky
386	916	910	915	920	910	890	850	rings on before pkg
387	933	925	942	932	897	862	743	5840 5900 5887
388	955	950	948	933	917	907	842	21000 abrd to 21715
389	882	902	890	891	865	850	795	gauge faulty - Co Lids -
390	765	863	875	876	850	857	822	2500 glucose
391	850	887	885	888	857	850	796	very sticky - Co Lids
392	917	920	918	898	898	850	717	5900 5900 5900
393	870	875	880	860	850	807	687	21000 abrd 21000 - gauge is good
394	845	876	880	830	800	675	572	Rings on after Corrugating
395	896	940	770	927	918	842	767	very sticky
396	893	942	940	925	927	810	690	5893 5900 5900
397	892	922	920	912	917	772	660	21000 abrd 21900 - gauge is good
								1st lids on after Corrugating
								rings put on
								6283 6255 6100

350

			50	100	150	200	250	300	Split inside – opened
	398	842	857	885	857	750	667	(blowout / all bumped rings)	21000 ab 21670 – 9000 + 4000 rings on after packing & corrugating – Co
	399	820	855	846	755	642	[illegible]		
	400	810	855	852	745	685	587		5814 5710 5668 – Co
805	401	850	868	885	850	841	827	822	8000 Cobalt flake
760	402	857	870	864	862	865	831	796	21000 ab 21639 – 9000 + 4000 rings on before pkg – Co
752	403	840	857	878	862	855	812	822	5588 5648 5593
905	404	962	981	998	987	978	968	953	21900 –
897	405	900	915	940	915	937	927	922	7000 Co flake
840	406	932	925	940	915	890	856	853	Mix less sticky than usual probably due to [illegible] – 6365 6315 6230 Co
857	407	1000	987	992	955	943	885	852	22140 6000 Co flake
828	408	843	862	906	880	886	882	860	mix less sticky than usual Co
815	409	895	897	894	867	866	835	833	6290 6265 6137
785	410	906	925	904	890	875	838	817	5000 Co flake
742	411	893	907	884	845	817	665	782	Co
811	412	922	940	927	887	860	805	785	
650	413	856	892	865	825	712	700	687	4000 Co flake
705	414	936	915	885	807	750	712	707	Co
762	415	957	917	921	846	840	767	767	
670	416	927	940	912	770	747	685	682	3000 Co flake
	417	902	917	827	771	737	738	682	
622	418	928	907	818	720	712	677	660	Co
Co	419	993	780	697	602	592	550	568	
	420	992	815	663	572	530	530	537	2000 Co flake
	421	950	872	751	625	590	562	562	Co
	422	767	835	875	837	696	600	477	Corrugated – pkd without
Co	423	772	855	900	907	775	670	561	rings then corrugated &
	424	753	900	918	865	731	635	525	rings put on Co
							935		

	75°
	648
	683
	630
	746
	788
	788
	710
	750
	713
	845
	833
	841
	732
	757
	795

Avg (Reversed) 1 run every 2 min
443-445 —

445 — should be replot on 200 lbs run

		50	100	150	200	250	300	
425	815	865	886	800	877	850	796	Corrugated after soaking + dry, + then rings 800 on
426	841	887	902	832	890	827	750	M
427	850	905	900	830	831	822	662	
428	837	841	836	800	818		792	Mix dried before play
429	850	865	868	832	840		812	Co
430	837	842	850	830	830		822	
431	776	801	785	787	752	755	703	
432	812	822	806	807	787	787	773	" M
433	837	835	817	815	783	767	742	
434	868	907	896	916	910	892	873	Changed to heavier plate
435	882	920	911	920	911	880	858	recharged to heavier on Co
436	842	923	931	925	913	900	880	6305 "6211 6305"
437	823	843	843	837	817	782	760	Pick with U shaped
438	845	870	867	858	841	822	805	Tamping tool
439	822	842	857	870	865	822	803	Co
440	842	845	844	857	841	840		Copper Hg Trans
441	818	842	850	860	842	850		Reversed — Co
442	842	820	855	866	848	860		
443	855	862	875	865	867	880		Cu Hg Trans. M
444	880	885	895	900	888	892		Reversed
445	850	875	885	872	868	865		
446	468	490	492	485	428	402	415	Flat plate
447	450	487	450	442	400	397	420	
448	473	502	485	467	437	442	390	

				50	100	150	200	250	300	
	250									
	351									
	377									
449	455	471	480	450	388	410	360	flat plate,		
450	450	487	470	432	393	410	407			
451	807	827	826	808	797	795	772	Assembled with oil		
452	830	864	846	832	850	835	817	none		Co
453	797	846	843	838	812	792	762			
454	827	857	850	845	837	822	800	Dup of 451-		
455	846	881	862	850	837	830	807			Ni
456	830	835	833	822	827	830	810			
457	775	810	812	825	800	792	757	Less porous green		
458	750	810	800	808	785	775	740		21600- absorbti	
459	750	780	777	782	752	750	716			Co
460	835	857	830	810	790	770	770	Dup of 457 more		
461	895	925	920	920	930	917	910	water absorbed	22060	
462	835	886	871	863	875	862	850			Ni
463	812	843	840	832	817	800	761	glucose 3500		
464	822	871	858	847	820	800	787			Co
465	833	847	850	825	842	827	813			
466	875	871	868	850	838	825	815	glucose 3500		
467	868	871	877	875	850	842	835			Ni
469	845	871	850	853	825	817	792			
468	832	590	840	877	752	712	712	glucose 3500		
469	855	850	832	815	782	725	766	7000 Co flotation		
470	868	887	886	856	812	795	790			Co

		50	100	150	200	250	300	
474	827	850	852	837	810	862	776	Oval rings
475	817	835	840	837	808	800	785	" Co
476	802	836	832	827	808	805	785	
477	881	908	905	900	875	865	835	Oval rings
478	880	895	905	906	902	862	850	" Ni
479	923	944	955	941	925	912	900	
480	892	897	907	892	903	892	885	Remnants 356-[illegible]
481	897	900	915	910	913	893	906	" Co
482	845	843	843	817	831	822	832	Remnants 368-371
483	825	842	838	827	835	820	823	" Ni
484	812	837	834	822	838	817	800	
484½	862	900	900	900	891	890	865	Remnants 371-374
485	872	896	858	882	860	867	870	Duplicate 368 Ni
486	832	851	862	850	842	837	792	
487	872	893	891	880	844	830	821	Remnants 401 Ni
488	855	860	872	871	850	832	823	
489								
490	968	921	886	838	827	840	773	Drop 404 Co
491	935	900	866	800	786	780	745	Remnants 410 Co
492	1025	936	863	830	785	750	700	" 413 Co
493	768	800	803	805	763	717	755	" 350 Co
494	865	885	897	898	878	870	857	" 383 Co
495	843	785	887	885	871	850	850	

23 Tramp Tubes, average on 5th run 1st Cold 861.
after 250 hot 824.7
or 95.72% of the original loss 4.28%

		50	100	150	200	250	300	
496	950	936	937	908	900	875	862	Run to 365 C
497	922	891	872	850	827	800	783	
498	897	892	905	900	857			
499	847	850	865	852	822	815	790	New Cutting Tools C
500	847	847	841	825	807	785	750	
501	847	917	915	916	910	900	890	
502	892	892	900	885	860	850	820	Co flake not from this
503	850	872	868	867	831	825	800	Hydrogen Co
504								
505	877	892	900	865	830	827	807	
506								ditto Ni
507	850	867	857	838	817	820	765	
508	772	765	787	755	737	732	730	50 Single Tramp
509	750	767	767	727	710	700	690	C
510	762	765	768	725	687	662	587	
511	920	930	955	952	950	937	932	50 Single Tramp
512	938	950	945	933	910	877	798	Ni
513								possibly quite different Tramp
514	845	866	857	845	828	815		250 only Hot
515	817	838	832	833	821	817		C
516	780	800	791	785	777	757		
517	821	847	830	830	808	802		
518	792	800	790	792	770	771		Ni
519	847	847	840	842	835	820		

		50	100	150	200	250	300	
520	742	697	520	400	125			250 mlg/ Aluminum
521	655	512	335	190	70			tube swelled Co
522	682	532	380	267	92			plunge bursted
523	725	580	290	140	57			
524	692	592	425	146	66			" Ni
524½	665	562	360	150	60			
525	795	830	832	840	845	840		250 mlg/ Copper Sulfate
526	802	846	850	850	850	837		Co
527	815	845	837	840	842	833		
528	750	775	777	775	788	782		
529	737	745	755	770	762	761		" Ni
530	781	806	800	802	796	790		
531	822	840	855	812	800			250 mlg/ Bismuth Nitrate
532	815	817	847	810	807			Co
533	813	840	850	820	802			
534	825	857	898	875	887			
535	792	832	872	850	892			" Ni
536	828	860	900	876	887			
537	816	875	900	870	870			250 mlg/ K Manganate
538	836	887	907	870	870			Co
539	775	842	847	821	800			
540	875	890	916	887	887			
541	888	897	917	887	895			" Ni
542	900	915	935	908	900			

		50	100	150	200	250		
543	750	800	807	825	823	802		250 mg/l Lead Oxide
544	745	767	750	765	760	755		Co
545	821	813	780	772	787	786		
546	855	898	886	900	903	896		
547	850	886	875	872	875	845		" Ni
548	812	886	868	875	862	850		
549	827	840	850	850	855			100 mg/l Each BaOH
550	812	800	856	857	857			CaOH Co
551	827	855	871	820	802			
552	882	885	910	896	910			
553	862	842	886	850	890			" Ni
554	846	855	881	850	870			
555	801	840	823	847	792	815		250 mg/l Sb Hydroxide
556	835	845	835	850	800	781		Co
557	796	800	788	800	730	735		
558	868	877	880	880	855	850		" Ni
559	870	877	885	900	881	870		
560	862	896	886	885	867	880		
561	832	885	866	875	850	845		250 mg/l K Chloride
562	855	891	881	885	862	846		Co
563	882	912	903	910	897	892		
564	850	878	870	880	877	883		" Ni
565	867	900	890	900	897	898		
566	883	900	890	897	887	886		
567	837	838						
568	825	818						
569	827	820						

		50	100	150	200	250		
570	700	728	648	777	650			Gelatin
571	700	550	215	750	150			Co
572	745	700	521	740	600			
643	700	817	795	787	742	737		100 Single Tampo
644	795	815	802	795	770	762		Co
645	797	825	820	820	787	785		
646	807	855	866	850	845	850		
647	795	845	866	860	837	847		" Ni
648	793	830	830	836	820	835		
649	850	877	891	891	875	891		100 Double Tampo
650	800	837	835	836	813	813		Co
651	831	825	877	872	857	852		
652	890	917	932	925	912	922		
653	908	936	950	955	950	950		" Ni
654	927	950	940	950	941	945		
655	915	900	930	922	906	897		75 Double Tampo
656	840	875	881	873	845	797		Co
657	865	880	895	887	870	850		
658	920	967	982	987	975	967		
659	910	941	955	948	942	932		" Ni
660	953	975	996	995	978	967		
661	841	903	915	912	892	886		75 Single Tampo
662	905	906	930	921	900	877		Co
663	848	900	907	912	890	880		

	50	100	150	200	250		
664	772	803	787	790	760	745	75 single lamps
665	775	796	788	792	767	772	Ni
666	792	803	795	800	790	765	
673	895	882	885	885	806	812	flake thro' 50 mesh
674	922	911	930	916	900	885	Co
675	612	920	935	916	877	853	
676	1026	945	875	782	727	717	only 4000 flake
677	1032	976	890	817	732	740	thro 50 mesh
678	1052	930	762	737	692	687	Co
679	1023	665	565	550	477		only 2000 flake
680	830	630	520	550	472		thro 50 mesh
681	925	617	442	442	392		Co
685	461	357	362	335	350		only 2000 flake thro
686	462	340	350	323	350		50 3.4 cake
687	413	337	360	343	357		flat plate
688	411	362	366	330	335		
689	452	352	347	321	317		
707	720	820	812	767	572		21000 absorbed Tp
708	867	953	972	944	772		25485 9000 flake
709	800	926	967	772	520		4000 oil 50 BT very
710	993	1060	1025	925	721		wet not stirred. Co
711	1023	1056	1057	1025	842		Ry green absorbed
712	1020	1065	965	791	632		water 24 hours

Co

Cutout

707-8-9 all busted very bad.

710 11+12 Splt in 2 places & bottle spilt.

Co

713 – Split in 3 pieces
14 Split
15 Split

		50	100	150	200	250	
713	935	931	935	842	860	Cut Out	Req. given above Gas
714	921	956	925	947	818		Ammonia 24 hours
715	825	940	917	876	858		Co
722	885	806	790	761	750	733	Soaked in H_2O with
723	805	821	805	821	807	813	changing water for
724	942	857	807	775	757	753	12 hours then
725	822	822	822	750	792		assembled – Co
726	845	852	845	821	817		Co tubes req –
727	836	827	820	797	787		– 21% Caustic Soda
728	868	867	848	833	827		Co
729	860	860	857	832	810		" M
730	885	915	887	857	850		
731	800	857	840	825	827		15% Caustic Soda
732	778	800	812	790	797		Co
733	757	825	795	791	795		
734	757	835	825	807	812		
735	917	800	790	775	770		" M
736	742	807	806	780	787		
752	900	985	993	955	1000	1002	Run Cold
753	802	880	887	861	880	885	Co
754	815	925	988	912	917	941	
755	800	917	913	900	922	920	
756	897	987	980	972	987	980	Run Cold
757	917	997	1010	990	992	996	M

		50	100	150	200	250		
758	831	950	967	927	960	982		Run Coled
759	832	918	940	903	930	945		C
760	895	992	1000	967	997	1012		
761	960	1030	1045	1040	1055	1055		
762	877	950	972	965	982	997		Run Coled
763	947	1025	1032	1017	1030	1033		W
773	842	842	840					Reg. so called one
774	825	845	842					within 7½ before
775	872	850	847					put on test. C
776	900	900	872					
777	855	900	900					" W
778	882	910	907					
827	518	507	490	437	450			3-4 Reg. Cofeb wrx
828	480	500	472	407	463			100 at smooth 250
829	487	482	468	402	462			at max Corrugt
830	517	502	453	412	430			
831	432	465	430	376	367			
903	767	872	860					Reg. by optician
904	828	877	867					would have time to
905	830	882	835					measure extra distortion
906	892	945	922					break up corrugations
907	840	895	900					wrx slowly - break C
908	875	910	910					" W

average Capacity of Capillary tubes 6½% lower than Ni plated tubes on 50 Hof

1142 — Split in 2 places
1143 " " 3 "

		50	100	150	200			
1130	853	893	915	792				42000 Ohm 20 20 cc Ethyl alcohol 15000 Cubic 7000 glycerin Co
1131	905	921	925	860				
1132	852	875	875	832				
1133	895	915	920	800				
1134	907	938	950	887				" Ni
1135	925	943	947	875				
1142	792	867	872	812				42000 - 1800 Ethyl alcohol of which 4 cc in H2O + 14 alcohol - 18000 Cubic 9000 glycerin weight segregation water and 2 Co
1143	800	847	860	350				
1144	887	948	957	892				
1145	791	903	905	847				" Ni
1146	840	928	932	862				
1147	900	953	932	792				
1148	870	920	922	817				42000 1900 cc Ethyl manipulated in air till not 8 H2O - till pump 15000 Cubic 9000 glycerin Co
1149	827	870	817	745				
1150	906	903	875	820				
1151	945	967	985	920				" Ni
1152	927	961	972	912				
1153	908	903	937	822				
1154	770	887	887	777				42000 1800 Ethyl Second of coloured 400 cc H2O carried in dissolved 3 Ethyl 1800 15000 Cu Cubic 9000 of Cus wire stuck Co in pressure
1155	827	866	865	792				
1156	817	850	835	755				
1157	871	947	950	830				
1158	858	938	942	872				" Ni
1159	847	898	900	825				

1161 Spl. t. & Cl. fully

1172 Spl. t. & Cl. fully

		50	100	150	200	250	300	
1160	772	822	827	783				42000 18 cc Ethyl of which 6 cc go down in the 8 lb. of lead 18 cc - Reg. Co
1161	787	845	852	761				
1162	776	816	832	750				
1163	881	940	940	765				
1164	890	960	962	770				" M
1165	858	860	837	800				
1166	866	858	842	700				42000 18 cc Ethyl of which 8 cc go down the 18 cc - not so freely into - Stopped plunger Co
1167	815	800	762	713				
1168	878	867	827	740				
1169	926	950	940	732				
1170	923	948	965	725				" M
1171	944	972	927	771				
1172	845	880	882	717				48 cc commercial Ethyl
1173	908	900	900	820				
1174	900	907	897	832				Co
1175	943	937	932	867				
1176	930	947	917	765				" M
1177	891	900	897	850				
1178								
1179								
1180								
1181								

	Cold	50	100			
1183	850					Mi plated Coffee
1184	848					Dry pkg - 100 sections
1185	823					16 - 37 grm. Illus 20
1186	825					
1187	840					
743			892			
744			897			
745			845			
746			843			
747			950			
748			945			
1301	902					5 + 12 300 sections
1302	882					grm. Illus 40 Dry
1308	906					5 plate Mustach 72 grm
1309	860					300 sections - Dry.
1310	892					12 grm 5 Coffeeff ½ thick
1311	900					300 sec Dry

100th run 748 + 745 overrun shifted a little + swelled

	Rod				
1319	670				450 soc Cu flakes 6 hrs 7 Mil gran 1 hr 6d,
1320	671				
1331	750				Smelling 300 soc Cu 5 Mil flake 12 gran 7% Bi2O3
1332	737				
1335	600				Smelling 5 Mil flake 12 gran 300 soc Cu 2 hrs
1336	650				
1337	781				Smelting 5 Cu flake 12 gran 1 hr 6d heated 300 soc Cu
1338	680				
1341	318				Bi2O3 oxide
1342	321				
1329	825				300 soc Cu 5 Mil flake 12 gran 1 hr 6d heated 6d heating 3 hours
1330	858				
1361	485				
1362	658				
1363	703				
1364	679				
1365	793				
1366	625				
1367	610				
1368	627				
1369	716				
1370	721				

Gra Cut out

1371	693
1372	705
1373	717
1374	627
1375	325
1376	337
1377	612
1378	550

Fwa Cutout

1383	705
1384	797
1385	715
1386	757
1387	763
1388	800

1397	896
1398	851
1399	775
1400	850
1401	832
1402	857
1403	827
1404	838

dump Cutout

1405	702		
1406	786		
1407	736		10 feet 24 g
1408	780		Temp open Tiller [illegible]
1409	687		
1410	640		Reversing [illegible]
1411	865		Temp Tank
1412	867		10/1000 Decrease
1413	900		
1414	875		30/1000 Decr
1415	925		
1416	902		60/1000 Decr
1417	815		10 feet 24 g
1418	840		2½ lb wt
1419	740		
1420	750		1½ lb wt
1442	800		Hole thro Cabin
1443	787		of [illegible] Tanks
1252	900		150 sections
1253	911		[illegible]
1254	895		Cofferdam
1255	900		New plumpy
1256	887		

1218	910				Ni plated
1219	892				Nickel flake -
1220	897				150 Section dry
1221	900				grain 1st -
1222	897				
1242	900				Ni pl. Fe -
1243	880				flake 1st 150 sec
1244	923				Co flake -
1245	907				
1246	960				
24					
1292	913				Tube dried out in heat
1293	887				6 hours measuring
1294	857				grain sections & cutting
1295	953				Ethyl -
1296	943				150 Section 743
					DT -
1297	621				150 section dirtier
1298	627				flake grafted

1425	847	Tube cut off
1426	797	10 feet left
1432	838	16 of 24 -
1433	845	Burrs outside
1444	903	Burrs filed off
1445	902	10 off 24 of Box
1446	900	Burrs more
1447	892	filed off -
1434	860	
1435	887	
1436	862	
1437	872	
1438	850	
1439	875	
1440	865	
1441	850	50
1448	830	spiral lich
1449	820	
1450	840	Nothing
1451	832	only spiral lich

1452	875		1400 [illegible] 1/2 oz
1453	882		
1454	880		Burrs filed all oz
1455	912		
1456	887		Regen 701 Regular
1457	867		
1458	875		Regen Neo 2 [illegible]
1459	877		
1343	337		Attach Bi [illegible] [illegible]
1344	595		
1345	937		pack [illegible] Rubber Tip – Simple Rubber 24 g – 41 mm 120 [illegible]
1346	925		
1347			
1353	772		10 [illegible] 24 g then 15. DT Simple [illegible]
1354	875		
1355	742		Same as above Test [illegible] Scale [illegible]
1356	670		
1357	820		Same as above but 60 length [illegible] Accumulated
1358	850		
1359	645		2 [illegible] Separable Flat [illegible]
1360	900		

1389	802	
1390	790	
1391	832	
1392	831	
1393	810	
1394	833	
1395	859	
1396	835	

[illegible] Ring 3

Experiments on Iron pockets
used 2 oz charges now they use for testing
Nickels in pockets, soaked in large quantity
of alcohol 24 hours. Then in grain alcohol
24 hours — Then took them out &
immediately reconnoitered them
at 250 atmos — put them with 4
nickels & sent up to test regular
way as Stagecoat irons are flashed.
Marked E Special Iron —

	before	after Recoinging
E1	Left 88	Left 79.5
	Right 90	Right 80.5 —
	Center 85	Center 82
	before	after
E2 =	R 95	R 85.5 —
	C 90 —	C 86 —
	L 95	L 85
	before	after
E3	R 90	85
	C 88.5 —	84 —
	L 92	88.5
	~~before~~ after —	
E4.	R 83.5 —	Dished out Collapsed
	L 81.5 —	
	C 80	

Big Bell Endurance test

	77th	157	234	
155	135.5 —	114	89.5	per cell —
538	470.5	395.9	312	per pocket

Quicquare - Cone

Cu	1.04
Ni	.78
Cobalt	13.75
Ag	86 oz
Au	3.38 oz
S	3.10
As	58.85
Fe	14.83
Silica	2.82
	95.49

10% 40 for Co
12 42 -
96% Cu & Ag FOB Ladoux
10c Nickel -

Last 2 carloads
or 1 load month until
notified to stop -

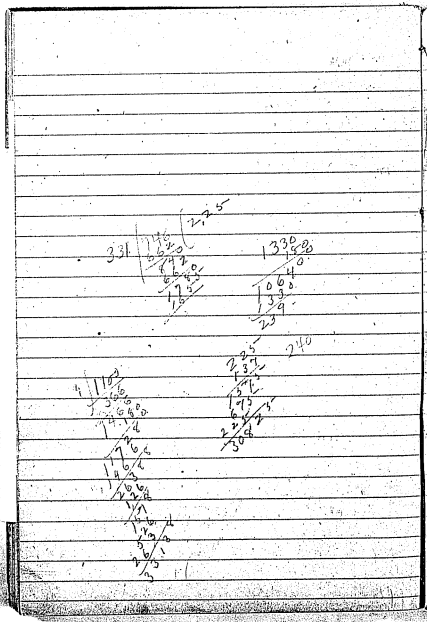
100 oz Ag or less -

Offers Davis 95% of Ag - 40 for 10%
42 for 12 %

Ladoux Bay 10c for 3% Nickel
7c for 8% Ni -

Assays last shipment of Barbados
resaddum to Germany

Cu	5.00
Ag	100 oz
Pb	14.8
Cobalt	15.00
Nickel	10.00
Arsenic	32.43
Antimony	3.00
Iron	14.5
Sulphur	1.90
	95.83



4.5 cake 72 E 5

Before		after
R 92		81
L 91		83.5
C 86		74
	E 6	
R 93		82
L 91		80
C 86.5		75
	E 7	
R 91.5		77
L 90		78
C 86		68.5
	E 8	
R 89.5		78
L 89.5		78.5
86.5		72

Cylinder
above soaked water then
alcohol, then pressed
200 atmos

Notebook, N-06-02-24.1

This notebook covers the period February-June 1906. All entries are by Edison, except for one by an unidentified experimenter. The book contains Edison's instructions regarding the conduct of storage battery cell endurance tests. In one entry Edison directs the experimenters to send the test results to him at Fort Myers, Florida. The front cover is labeled "Edison Tubes. No. 350 to No. [ ] 2-24-06 to [ ]." The pages are unnumbered. Approximately 30 pages have been used.

06-02-24.1

DATE	RUN	HRS. CH.	M.A.	RUN @	TO. SV.	TO V.	CALIPERS.
50 RUNS ON HOT TEST. CHANGED KOH.							

New Cells Feby 27th
all cells are loaded — 21% 24 hours before loading
Edison numbers

350-
351
352 } Charge and discharge regular rate same as usual on tube cells

Make 6 complete charges and discharges cold then put on hot endurance + run 50 chgs+dischgs — making 5 cold tests between each run of 50 hot chgs+ dischgs — same as now —

353
354
355 } ditto

356
357
358 } ditto

359
360
361 } ditto

362
363 } ditto
364

365
366 } ditto
367

368
369 ditto
370

371
372 } ditto
373

374
375 } ditto
376

377 378 379	ditto
380 381 382	ditto
383 384 385	ditto
386 387 388	ditto
389 390 391	ditto
392 393 394	ditto

395 396 397	ditto
398 399 400	ditto
401 402 403	ditto
404 405 406	ditto
407 408 409	ditto
410 411 412	ditto

413 414 415	ditto
416 417 418	ditto
419 420 421	ditto
422 423 424	ditto
425 426 427	ditto
428 429 430	ditto

439

1 { 9 A.M. – 9 PM ch
2 P – 5 A ok

2 { 5 A – 3 P ch
2 P – 1 A ok

3 { 9 A – 11 A ch
11 A – 9 P ok
9 P – 7 A ch

431
432
433 } dell Co.

434
435
436 } This group to 6s charged 10 hours at regular rate, then allowed stand 10 hours - again charged 10 hours then stand 10 hours again charged 10 hours & allowed to stand 10 hours Then charged 10 hours & Discharged at regular rate after this give them 5 regular Cold charge & discharge & then put them on regular hot endurance test.

437
438
439 } same as 350 -

ec 498

440 } This group is to be run 3 times
441 } Cold - then reversed once equal
442 } to a full charge given it but
in reverse direction - Then it is
to be charged + discharged 3 times
in the regular way cold -
Then do this once more chg + dischg
3 times. Then a reversed charge +
Recharge ~~+~~ dischg 3 times cold.
Then put on hot test for 50 runs
but give it a reverse charge
hot once a week -- then after
the 50 charges + dis. 5 times cold
+ put back on hot test, do this
on every hot test of 50 runs

443 }
444 } work this group precisely
445 } like group 440

446 }
447 }
448 } work these same as 350
449 }
450 }

451
452 } work same as 350
453

454
455 } ditto
456

457
458 } ditto
459

460
461 } ditto
462

463
464 } ditto
465

466
467 } ditto
467½

468
469
470 } Work same as 350

471
472
473 } ditto

474
475
476 } ditto

477
478
479 } ditto

480
481
481½ } ditto

482
483
484 } ditto

484½
485 ditto.
486

487
488 } Work same as 350
489

490 ditto

491 "

492 "

493 "

494 } "
495 }

496 } "
497 }

498 Printed same as group 440

499 } treated same as 350
500

501 ditto

502 }
503 } ditto
504

505 }
506 } ditto
507

508 }
509 } ditto
510

511 }
512 } ditto
513

After I have gone Carter will deliver your cells from 514 to 632 — These are all to be run like 350 — in the regular way —

Send the 6th run of every cell to me by mail to Fort Myers Florida,

I will probably be back before the hot run is run off cold —

Edison

NOTICE

All cells up to this point are run in reg 2% KOH

350

514
515 } Treated same as 350
516 but with special solution

517
18 } ditto
19

520
21 } ditto
22

523
24 } ditto
24½

525
26 } ditto
27

528
29 } ditto
30

531
32 } ditto
33

534
35 } Treated same as 350
36 but with special solution

537
38 } ditto
39

540
41 } ditto
42

543
44 } ditto
45

546
47 } ditto
48

549
50 } ditto
51

552
53 } ditto
54

555
56 } Treated same as 350
57 but with a special solution

558
59 } ditto
60

561
62 } ditto
63

564
65 } ditto
66

567
68 } 1906 JUN 18 REC ditto
69

570
71 } ditto
72

573
74 } Treated same as 350
75 Rg 2% KOH

576
77 } Treated same as 350
78 Runs in Reg 2170 KOH.

579
80 } ditto
81

582
83 } ditto
84

585
86 } ditto
87

588
89 } ditto
90

591
92 } ditto
93

594
95 } ditto
96

597 } Treated same as 350
98 } Run in Reg 2170
99 }

600 } ditto
01 }
02 }

603 } ditto
04 }
05 }

606 } ditto
07 }
08 }

609 } ditto
10 }
11 }

612 } ditto
13 }
14 }

615 } ditto
16 }
17 }

618
19 } Treated same as 350
20 } Run in Reg. 7 & KOH

621
22 } ditto
23

624
25 } ditto
26

627
28 } ditto
29

630
31 } ditto
32

633
34
35 } ditto
36
37

638
39
40 } Treated same as 350
41 } Run in Reg 2 1% KOH
42

643
44 } ditto
45

646
47 } ditto
48

649
50 } ditto
51

652
53 } ditto
54

655
56 } ditto
57

658
59 } Located same as 350
60 } Run in Reg 2170

661
62 } ditto
63

664
65 } ditto
66

667
" 68 } ditto
69

670
71 } ditto
72

673
74 } ditto
75

676
77 } ditto
78

679
80 } Treated same as 350
81 } Run in Reg 2.1% KOH

682
83 } ditto
84

685
86
87 } ditto
88
89

690
91 } ditto
92

693
94 } ditto
95

696
97 } ditto
98

699	
700	
01	Treated same as 356
02	Run in Rep 21% KOH.
03	
704	
05	ditto
06	
707	
08	ditto
09	
710	
11	ditto
12	
713	
14	ditto
15	
716	
17	ditto
18	

719
20 } Treated same as 350
21 } Run in seq 2170

722
23 } ditto
24

725
26 } Treated same as 350
27 } but run in a special solution

728
29 } ditto
30

731
32 } ditto
33

734
35 } ditto
36

737
38 } ditto
39

740
41 } Treated same as 350
42 } but run in a special solution

743
44 } ditto
45

746
47 } ditto
48

749
50 } Treated same as 350
51 } Run in Reg 21% KOH

752 } These are not to go on Hot Endurance
53 } but are run cold. Give 6 reg
54 } Reg 21% KOH

755
56 } ditto
57

758
59 } ditto
60

Run cold on Hot Test Table

Run cold on hot
Test Table Jr.

761
62 } Treated same as 752
63 } Reg 21.70 KOH.

764 } This group is to be used to determine
65 } the charge and discharge rates
66 } economy etc. Not to go on
endurance. If it gets cold enough
to make a charge and discharge
test cold.
Give 5 reg runs before the above.
Plot both your charge and
discharge runs on the efficiency
tests.

766
350
416
421
437

767
68 } Treated same as 350
69 } Run in 21.70 KOH

770
71 } Ditto
72

773
74 } Ditto
75

MAY 21 REC

MAY 21 REC

776
77 } Treated same as 35. Run in 21% KOH
78

779
80 } Ditto
81

782
83 } Ditto
84

785
86 } Ditto
87

788
89 } Ditto
90

791
92 } Ditto
93

794
95 } Ditto
96

797
98 } Treated same as 350
99 Run in 7170 KOH

800
01 } Ditto
02

803
04 } Ditto
05

806
07 } Ditto
08

809
10 } Ditto
11

812
13 } Ditto
14

815
16 } Treated same as 350
17 but Run in special sol

818
19 } Treated same as 350
20 but run in special sol.

821
22 } Ditto
23

824
25 } Ditto
26

827
28
29 } Treated same as 350
30 Run in 21% KOH
31

832
33
34 } Ditto
35
36

836
350
486

MAR 28 1908

Notebook, N-06-04-05

The only dated entry in this notebook is from April 1906. All entries are by Edison. The book contains storage battery endurance tests for cells using cobalt or nickel flake. The tests involved the use of various substances to hold the flake in the cell tube, including molasses, glucose, and caramel. There are also entries regarding experiments with the Lalande primary battery. The pages are unnumbered. Approximately 100 pages have been used.

61¼	12.7/	Mol	26.8	Coll-70/30 flake (Covered good)	3.14 grams	Not plated (Wire)	(5.031)
	12.25		26.3	Covered flake 30%	3.08	Tabs (Dark and good)	5.030
61.3	12.25		26.3	(Layers well very stiff not have broken tabs)	2.93 "	Good [illegible]	4.785
67.8	13.8		18.9	Covered perfect grams (Good Lustrous)	3.15	Tabs broken well (Good)	4.675
	Lustrous		Well	Covered perfect grains-Good lustrous -	3.61	Tabs broken well Overall flake	5.350
68.8	13.8		17.2	Stiff (Grains Well-Good Color)	3.71	Good Tabs broken well -	5.350
"	"		"	"	3.60	Corrugated and good [illegible]	5.237
"	"		"	"	3.80	Corrugated [illegible] good	5.520
68.4	13.8		17.2	Covered Color Corrugated - Good	3.63	(Wrinkled) Color	5.267
71.4	14.2		14.2	Covered, Not Lustrous	3.59	Covered OK -	4.960

Thus 20 on 130 (Not well covered) Corrugated (1.12) 1.25 gd.
61/64 11.55/Mol 26.19 Co flake, 3.35 grams (Coll Tide plate) **Cobalt** Overplate
Same Corrugated (Thus 20 on 40 Covered Color Thus 20 on 130) Corr 1.25 Well **Cobalt** "
61/64 12.18 Mol 26.18 Ni flake grid Covered 3.29 g (Corr 1.25 Well Thus 20 on 40) **Nickel** "
Iron — Mangnetic
Most even of all the runs, 70/30, Coll (70/30 flake) Sheen.
No flake

	Coll	50	100	150	200	250	300	350	400	450	500	550	597	627	677	727
2	777	747	697	741	725	697	721	775	712	683	572	447	415	475	437	395
3	712	692	312	692	732	712	745	740	722	772	652	600	555	595	572	532
4	651	655	647	700	740	725	775	717	658	648	652	587	577	560	540	530
5	390	392	324	375	75	37	25	40								Mol
6	656	602	630	657	695	605	668	620	582	577	549	510	500	463	462	476
7	352	315	321	323	290	275	260	227	234	222	220	202				
8	717	735	725	710	665	660	670	615	572	520	482	426	370	400	407	402
9	647	665	583	640	530	453	397	330	280	249	245	215	Mol			
10	838	785	836	833	845	798	696	552	367				Mol			
11	785	427	320	315	275	250							Mol	Well-Color		
12	850	806	571	782	875	850	826	703	635	571	455	512	Mol	512	502	475
13	870	806	763	677	560	553	486	445	397				Mol			
14	815	791	771	740	700	675	635	382	195				Mol			
15	732	440	385	395	252	246	218	208					Mol			
16	745	640	666	620	547	486	426	365	333							
25X	746	776	819	767	780	733	596	530	450	445			Mol			
26X	740	777	800	768	781	796	735	502	706	650			Mol			
27	699	766	782	700	621	582	460	415					Mol	Brighter Lower than 27 & 28 Corrugated 33% when hot		
28	725	767	796	776	793	757	710	665	602	547	502	502	Mol	492		
29	836	745	636	491	461	377							Mol			
30	732	434	887	677	810	833	67	507	363				Mol	Corrugating - ng		
31	875	870	895	881	940	782		655	522	409			Mol			
32	720	903	906	908	907	887	640	530	416	350			Mol	ringing		
33	838	887	863	881	853	838	766	647	505	458			Carmel			
34	732	772	777	792	800	770	715	618	422	290			Carmel	Dun made		

76.9% grain - 15.38% Corn flakes, 7.69% Caramel.

	Cold	50	100	150	200	250	300	350	400	450	500	550	
35	760	771	785	791	807	795	796	722	650	665	470	448	Minimum limiter Minimum screw 84 gm 16 flake
36	792	791	800	510							600 Pint		Plus bus 50% screw bundles 50 to 20 flake
37	792	756	665	600	547						400		Wikes only - no flow
38	782	570	306	215									KOH rolled
39	587	771	472	477									Caramel 50 Corn flakes
40	772	672	654	619									50 Caramel
41	797	865	815	816	817	745	650	592	435	330			75 Caramel Caramel 100 "
42	805	797	595	492									Tube Pt 146 gm Tube Pt 216 gm
45	710	782	797	792	770	750	665	572	447	380	Caramel		Large cinnamon 39 Packed round vertical
47	800	776	590	492									Caramel
50	493	530	497	460									8 oz long Caramel
51	516	600	400	283									" " Caramel
52	590	532	400	330									1 lb " Caramel
53	600	687	621	611									1 lb " Caramel
54	717	787	725	710	637								2 lb " Caramel
55	750	842	761	792	817	750	570	391	190	63			2 lb " Caramel
56	450	287	225	347									Caramel
57	832	855	717	608	530								Caramel
58	783	695	570	440									Caramel
59	795	837	843	821	672	603							Caramel
60	797	782	767	815	817	578							Caramel
61	798	327	470	330	238								"
62	796	602	500	—	433								"
63	834	935	862	907	850	637	653	470	95				Caramel
64	832	606											"
65	857	865	890	915	882	837	518	440	176				"

	0(0)	50	100	150	200	250	300	350	400	450	500	
66	805	815	825	805	612	542						Carmel
67	777	747	610	465	392							"
68	818	597	471									"
69	763	776	810	595	607							Carmel
70	762	775	797	795	592	697	337	162	0			"
71	745	702	715	690	610	538						"
72	650	22	77									Carmel
73	500	27	167									"
74	662	400	227									"
75	836	690	570	[illegible]	407							Carmel
76	836	830	592	[illegible]	695							"
77	830	767	707	640	542							"
78	825	835	745	565	692							Caramel
79	792	717	843									"
80	800	800	675	692	621							"
81	799	715	660	630	693							Glucose
82	796	665	527	517	517							440 " 530
83	772	822	800	542	567	700	650	550	490	455	492	437 "
84	799	702	740									Glucose
85	815	918	880	911	880	812	697	605	450			"
86	812	650	550	550	525							"
87	824	787	575	582	595							Glucose
88	772	635	525									"
89	840	847	857	875	850	690	565	447	365			"

	Cal	50	100	150	200	250	300	350	400	450	
90	897	642	532								McTrini
91	892	602	476								"
92	868	544	497								"
93	884	707	887	737	682						Rossini
94	902	710	533								"
95	914	707	536								"
96	840	840	785	682	577						Rossini
97	845	778	621								"
98	850	770	627								"
99	866	510	460								Rossini
100	907	531	460								"
101	886	605	462								"
102	906	662	570								Rossini
103	906	625	493								"
104	907	760	650								"
105	897	592	500								Rossini
106	885	628	565								"
107	907	733	533	475	631						"
108	970	856	865	915	765	635					Rossini & Sherlock 12 very hot room
109	877	748	696	662	532						Rossini
110	865	843	850	760	671						Rossini
111	497	408	385								Rossini & K Suffolk
112	525	400	353								
113	572	470	443								

	Col	50	100	150	200	250	300	350	400		
114	773	595	402							Resin	Nickel flake
115	801	700	632							"	"
116	580	533	352							"	"
117	923	903	768	652	442					Mol	
118	892	636	476								
119	830	617	495								
120	817	618	535							Glycerin	
121	887	663	650							"	
122	572	572	480							"	
123	855	745	600							Mol	
124	879	671	611							"	
125	878	687	597							"	
126	732	657	60							Mol	Nickel flake
127	766	587	579							"	"
128	767	655	645							"	"
129	912	745	598							Mol	
130	865	811	777	722	612					"	
131	906	787	702	670	495					"	
132	835	575	500							Mol	
133	785	621	541							"	
134	835	617	512							"	
135	900	937	862	883	575					Glycerin	
136	906	787	600								
137	906	697	557								
138	X										
139											

	Cal	50	100	150	200	250	300	350	400	
140	944	872	835	850	813	630				glucose
141	927	910	880	932	917	700	613	508	456	"
142	847	662	581							"
143	947	742	671							glucose
144	944	797	750	667	592					"
145	953	785	750	667	633					"
146	922	592								Mol ½ Cu fehling ½ Nickel fehling
147	880	820	812	526	652					" "
148	872	640	445							" "
149	898	840	800	737	742	623				Mol.
150	862	715	625							
151	878	640	726	675	578					
152	881	817	812	800	710	612				Mol 212 (Fehling Nickel 74/90)
153	874	730	588							" 194 Nickel — 5 samples (Fehling Nickel 154) equilibrium 24 hours
154	870	927	837	885	852	758	686	630	600	594 Corrected — 6423 7933 — 7997 7990 540 547 — Group 57
155	840	737	650							Mol Nickel fehling — 62½ g 1/10 Nickel
156	907	762	695							" 201.5 (Fehling)
157	857	662	760							" Nickel) Dried 105 degrees C — see Gellée
158	847	785	738	745	657					Mol Nickel fehling — 10 Nickel — 75 x 25 (Fehling)
159	911	765	720	677	586					" 1125 — 550
160	885	865	866	925	1097	787	730	657	635	" 597 598 524 — 563
161	863	700	588							Mol 180.00 g 3000 (Fehling 5000 alg) Mol
162	868	477								"
163	835	642	577							"

64.3	84.9 Mol	21.4	116.6 79.4 10 hours	3.63	15.650	116.30 in 100	

	Cal	50	100	150	200	250	300	350	400	
164	828	537	490						Wol	15000 g 4000 flake 5000 Wol
165	833	661	583						"	"
166	835	605	426						"	
167	830	685	575						Wol	15000 5000 flake 4000 wol
168	881	737	712	X	652				"	
169	847	710	610						"	
170	832	713	566						Wol	15000 7000 flake 7000 wol
171	856	628	675						"	
172	845	670	531						"	
173	832	800	718	712	787	660			Wol	15000 + 6000 flake 7000 wool + 5000 Wol 2
174	825	717	552						"	
175	837	612	626						"	
176	847	665	300						glucose	15000 - 3000 Nickel flake
177	777	725	648						"	"
178	759	781	790	712	482				"	"
179	792	773	816	817	570				glucose	15000 + 4000 flake Nickel flake
180	765	657	412						"	"
181	715	681	568						"	"
182	760	715	685						glucose	15000 + 5000 Nickel flake
183	785	662	548						"	"
184	747	625	517						"	"
185	705	726	723	686	481				glucose	15000 + 6000 Nickel flake
186	737	681	601						"	"
187	725	720	692						"	"

	Cold	50	100	150	200	250	300	350	400		
188	735	790	825	845	920	668				Glucose 18000 7000	Nickel flake
189	697	797	750	787	630					"	"
190	715	790	655							"	"
191	766	778	750	770	626					Mol.	Nickel
192	762	710	562							"	"
193	780	800	800	865	945	645				"	"
194											
195											
196	120										
197	53										
198	1000	932	793	700						Mol.	100 T
199	918	752	592							"	"
200	982	920	786	700						"	"
201	710	605	585							Glucose 100 T	Nickel flake
202	685	645	579							"	"
203	662	490	460							"	"
204	695	550	480							Glucose	Nickel flake
205	676	641	630							"	"
206	645	617	557							"	"
207	702	752	783	650						Cuckoff	
208	592	586	563							"	
209	574	632	560							"	
210	1005	945	917	867	775	632	580	381		Glucose 70 7000	50 Double T
211	987	920	900	782	663	545	447	332		"	70/50 mix
212	990	925	912	782	720	566	450	381		"	"

402 grams

22 grams 7000 / 50 / 2000 / 22 / 7

	Cd	50	100	150	200	250	300	350	400	450		
213	1097	1020	562	271							glucose,	Run in 33%
214	1105	697	340	285							"	"
215	1067	981	316	347							"	"
216	827	900	770	700	570						glucose	Nickel formate,
217	807	665	540	443							"	
218	786	777	862	855	873	770	697	676	647	660	587	
219	803	760	845	835	852	635	580	515	467		glucose	50T 4 hr at. Nickel formate.
220	806	795	740	490								
221	763	732	815	800	652	575	495	432				
222	727	763	785	792	785	777	637	572	507		glucose,	on calcium complex Mix dried 4 hr
223	717	797	792	755	730	690	620	505				
224	717	716	725	680	642							
225	735	761	797	755	698	607	560	462			glucose.	
226	724	757	745	630	563							
230	703	757	745	727	707	662	550	523	471		Cd	10% KOH 10% K_2CO_3
231	762	657	792	560	467	795	758	792			glucose	765 cooler 4 mins under 200
232	625	630	671	587	438	760	725	692			"	737 hot Column first Cmpd
233	572	723	730	710	607	817	777	730			"	821 Kott 4 mins 4 mins three to hot run
234	790	811	825	830	Cd 805	675	697	697	552	515	765	760 glucose.
235	744	792	815	810	831	635	757	635	522	510	502	
236	763	820	857	850	853	847	772	668	565	550	527	
237	767	X	866	795	647	585	460				glucose	
238	722	X	825	797	777	695	622				"	
239	736	X	811	790	742	640	552				"	

	Col 50	100	150	200	250	300	350	400	
240	780	765	620	557	537				Glucose, 100 T
241	770	811	845	810	723	621	512	426	"
242	789	672	585						"
243	820	768	685	505	486				Glucose 50 Double T
244	812	837	870	840	760	606	461	387	"
245	792	630	520						"
246	867	891	908	867	761	605	437	377	* 1 gram Sodium in 247
247	802	718	547	272	130				Glucose " "
248	797	825	782	690	601	480	420	340	" 100 T 4 lbs
249	977	750	575	265	155				" "
250	965	977	987	948	825	573	390		* 1 gram Aluminum — Koff 3% 100 T
251	962	835	682						"
252	903	853	673						"
253	880	712	582	468	365	200			* 1 gram Zn Sulfate Glucose 50 D Tempi —
254	920	907	880	815	671	518			"
255	945	866	757						Glucose 50 Double T.
256	932	661							"
257	936	806	677						"
258	892	502							* 1 gram arsenite K Glucose 50 Double T
259	890	727	617	495	250	242			"
260	900	905	920	887	770	526			"
261	977	750	648	505	155	65			* 1 gram minimum of Glucose Glucose 50 Double T
262	955	800	700	617					
263	860	718	581	461	273	241			1 gram Acetate Lead

Notice Copper —

	Col	50	100	150	200	250	300	350	400				
264	892	857	865	802	515	323				Glucose 50 Double T			
265	921	937	988	940	631	436				"			
266	901	895	841	763	445	320				"			
267	879	885								Glucose			
268	902									Decatitrate			
269	894												
272	923	941	883	845	768	568				Glucose. Burr inside			
273	905	957	965	947	943	917	889	865	875	Burr inside			
274	932	785	732	727	592	422				"			
275	760	840	845	730	697	623	687			Glucose Outside Burr			
276	752	771	720	660	620	568	526			"			
277	745	680	631	540	516					"			
278	942	982	906	561	390					Glucose Thicktitrate Cut out			
279	917	958	967	906	595	568	431			" " Burr outside			
280	953	976	975	847	598	478	365			" " "			
281	932	972	843	840	707	553				Glucose Burr inside Burr inside			
282	925	972	987	1010	1027	847	659	745	715	Glucose "			
283	907	730	630	622	592	391				" " [illegible]			
284	622	660	678	602	552	466	452			Glucose			
285	618	728	741	657	627	531	441			Glucose – Burr outside			
286	623	722	700	652	606	573	435			" 50 Double T "			
287	938	976	971	915	910	800	737	632	570	" "			
288	971	972	947	927	882	703	590	543	500	Burr inside Burr inside, Single T.			
289	937	917	900	887	880	623				"			

62	1.67	1.00	2.04	[illegible]			61.490				

	Cold	50	100	150	200	250	300	350	400		
299	795	921	756	587	520						Glucose 50 sec 4 T to Section
300	883	891	887	572	597	521	415				" " "
301	705	692	625	615	472						" "
305	828	775	643	423	159	787	632	485	430	50 mlg K_2S	70 ml 30 Glucose — X
306	793	830	820	530	87	933	858	785	762	20	put in fresh
307	810	775	640	287	56	864	740	587	450	10 50 Doub T Burns out	KOH —
308	772	770	680	555	580	545		"			
309	770	897	845	603	597	625		"			x Paired segment Curve 24 h Burns outside 50 Doub T
310	770	845	845	692	650	587	597	"			
311	798	892	862	800	750	718	585	"			x lost 15 min nonpulsatile
312	793	785	705	717	690	562	532	"			but fired 6 CC 50 Doub T
313	792	890	903	597	850	707	657	"			
314	883	787	790	642	772	597		"			50 Doub T. Burns out
315	800	787	750	655	582	471		"			" "
316	792	685	620	535	537	447		"			" "
317	798	677	597	370	410	302		"			" "
318	762	812	775	690	571	415		"			" "
319	777	817	785	710	580	447		"			" "
320	798	633	536	481				"			Big Burns — 50 Doub T
321	737	575	440	141				"			" Burns out
322	737	663	525	483				"			"
323	827	925	842	607	442	396		"			Thick Cobalt — Burns out
324	825	857	808	782	540	438		"			" 50 Doub T
325	825	942	908	810	550	441		"			" "
327	863	932	690	642	297	236					Thick Cobalt "
328	785	635	667	500	282	167					50 sec 4 T each

after Last Cold run + 1st 50 hot run
This on 41 tubes much higher than Cold run
47 " a little higher
67 " " Lower
67 " much lower
70 " Very bad — very much lower

Average higher than 50 milamp on 1st hot above Cold between 50 & 100 — so average life 17% hour lower than 50 down to 1 — 1856.
Showing that if after the last Cold run and the last Cold run after 1st 50 hot runs shows anywhere from 1 to 50 points in Capacity higher — The life will be a little better than if the Capacity was higher than 50 to 100 better.
The proportion is as above — roughly —

There is no doubt that if there is an improvement in Capacity the life will be greater than if there is a fall of Capacity

Average of 72 tubes higher after 1st 50 hot is 4615 milamp hours in Capacity

	Cold	50	100	150	200	250	300	350	
329	912	927	761	407					Rosin Burn in
330	890	941	894	555					" 50 D.T.
331	887	856	788	500					" Tried with Cobalt
332	952	955	868	550					Glucose Thick Co Cobalt —
333	953	917	845	605					" "
334	981	958	865	487					" "
335	942	906	642	332					Very thick Burn in
336	930	900	855	587					" " "
337	931	767	538	285					" " "
338	916	915	836	706	623	511			Glucose Thick Co Cobalt 50 Double Hours ~~over~~ 62. 1st Hot 2 milliamp - 50 Dou T
339	917	917	897	897	737	727			" 50 Dou T ~~Hot~~
340	928	920	893	577					Low Koff soak - in only one
341	955	735	669	437					
342	930	865	810	623	492	482			Cane Sugar 33⅓ Koff. Thick Cobalt 50 Double T - cold slow soak
343	995	932	812	515					" "
344	730	762	640	545	468	467			Burn in — Thick Nickel 50 D T
345	732	767	646	571	518	500			Cane Sugar 33⅓ Koff.
346	732	751	593	545	520	490			" "
347	785	647	520	470	425	315			Dug — Rubber after
348	730	742	551	557	495	477			50 Hot runs Yellow
349	782	630	530	580	510	450			same as group 344 —

no Cobalt

group not results				50	66		no loss on any of the 3
group results				50	8		"
"	"			100	9		"
"	"			150	5		"

4) 2267 / 567

4) 2198 / 549

4) 1848 / 462

4) 2050 / 512

4) 2448 / 612

4) 2188 / 547

4) 1955 / 391

4) 2074 / 518

4) 2747 / 687

4) 2791 / 698

4) 1955 / 391

4) 1909 / 477

84 packets, 842 flake Cobalt, mixures flat packets.

	1st	15th	31	74	50 Hot	100 Hot	150 Hot	200 Hot	250 Hot	
1	717	697	588	528	545	405	528	477	425	3.4 Cake
2	715	707	577	598	567	490	550	580	565	
3	693	695	572	586	553	473	500	470	441	
4	622	692	508	576	533	480	472	522	475	
	687	698	567	547	549	462	512	518	477	

Another lots above with E 100 12 of Cake.

	50 Cold	50 Hot	100	150	200	250	300
Started. 607 —	613	490	540	550	530	450	

400# mill Half Items.

No 1	417
2	393
3	353
4	379
5	403
	391

Requires.

	50 Cold	50 Hot	100	150	
1	494	477	417	417	
2	517	445	393	393	
3	571	457	400	373	
4	528	439	400	373	
5	517	430	393	408	
	511	451	399	394	

Cobalt plates & Cups

Req mix — Req press —

Note – The best tubes for life are 2 + 3 Cobalt + 12 + 26X with following proportions – 18000 Green 7875 flake 3375 mol – The green in No 2 thro 20 on 150 + No 3 thro 20 on 40 No 2 not well covered No 3 well covered.

2 3 + 4 were all corrugated on inside 125 atmos, Dally plate flake thick – : No 6 which has flake twice as thick but the best of all 10000 Co to best 70 green 30 flake best proportion, Burn inside best, Green thro 20 on 200 best,

Not more than 12 To 13% of the mix should be binder – Molasses only glucose best, 50 Single Tempi ok 75 better possibly 50 Double tempi better, Warm mix ok –

Corrugating or packing with round nose tool possibly necessary – or at least good, Porosity of green will ~~probably~~ better be satisfied by absorption of water before use of binder so binder will not dry so quick in mixing – Minimum binder good Good Cleaning necessary in best, Wet or dried mix uncertain for long run, Welding of tubes may be necessary as they get hot best and are less attacked, See 26X gets 23 + 12 not so

Flake sieved to screened thro 20 mesh screen,

								Multiplier
350	812 840	351	803 820	352	806 832		60.8 g	2.3 Co
353	908 927	354	911 940	355	880 910		60.8	2.33 Co
356	912	357	860	358	885		61.9	2.54 ni
359	850	360	900	361	923		61.9	2.66 ni
365	950	366	931	367	943		61.9	2.63 Co
368	898	369	826	370	897		61.9	2.53 ni
371	875	372	850	373	862		61.9	2.48 Co
374	855	375	866	376	902		61.9	2.48 Co
377	925	378	915	379	935		61.9	2.6 ni
380	850	381	900	382	882		61.9	2.35 Co
383	883	384	877	385	883		63.3	2.48 Co
386	916	387	933	388	955		63.3	2.49 Co
389	882	390	765	391	850			Co

233 about 1%

350-1-2 – 21000 g Thus 20 fumes in – 4500 g Glue – 9000 Cu fl thus 15 –
5800 5460 5975 – Copper St rings mm on left
3.53 3.49 3.51

353-4-5 – all the except Cu flake thus 20 –
6.325 6973 6377 – mm rings
3.39 3.43 3.41

356-7-8 g 21900 – Same as above except Ni plated – 5.944 5756 5824
mm rings 3.43 3.43 3.44

359-60-61 – 21745 – thus 30 fumes in – 9000 Co – 4500 g – 50 OT Nickel Co
5.394 5.555 5831 – mm rings
3.25 3.28 3.50

365 – 21690 – thus 40 fumes all in – Co flakes – 9000 Co 4500 g –
Co flakes – 50 OT – 6.1685 – 5.925 – 5.1880 –
3.65 3.55 3.53 gm

368-9-370 – Nickel Copper mm rings 21650 – 9000 Cu – 4500 –
no plated – 50 OT – 5.745 – 5651 5835 –
3.47 3.39 3.48

371-2-3 – Dup of 368 except Co plated OT – 5.746 5.740 5.584
3.47 3.46 3.48

374-5-6 21600 – thus 20 fumes – Co plated – rings mm on left – 5.855 – mm rings
9000 Co 4500 g Glue 50 OT – 5.850 5.873 5.849
3.52 3.52 3.52

377-8-9 – 21665 – thus flakes – rings mm put on left – 5.915 5.912 5.915
9000 Co 4500 g – 50 OT – 3.59 3.58 3.59
mm rings

380-1-2 – 21705 – Copper St – Copper Ni – mm sides – rings on bottom Cor
mm rings – flakes off – 9000 Co 4500 g 6.277 6.141 – 6.181 –
3.73 3.75 3.73

383-4-5 – 21615 g – 9000 Co – 3500 g Glue – Co flake rings mm on left
– 50 OT – 5.840 – 5.790 – 5.857
3.16 3.17 3.16

386-7-8 – 21700 Co 9000 g Glue 2500 Co flakes – Tuesday
rings mm on left – 5.970 5.960 5.900 –
3.78 3.79 3.77

389 – 21720 – Co plated Copper St – rings mm left Cor
9000 flake – 4000 g Glue – 5.817 5.814 5.828

No		No		No			
392	917	393	870	394	845	62.7	2.51 in
395	896	396	893	397	892	62.7	2.36 in
398	842	399	820	400	810	62.5	2.39 Co
401	850	402	837	403	874	64.3	2.42 Co
404	962	405	900	406	982	66.5	2.33 Co
407	1008	408	843	409	895	68.8	2.21 Co
410	906	411	893	412	922	70.5	2.33 Co
413	856	414	936	415	957	73.	2.29 Co
416	927	417	902	418	928	75.5	2.15 Co

Metallography

8000	2.42
7000	2.33
6000	2.31
5000	2.32
4000	2.39
3000	2.42
2000	2.42

392-3-4 21955 - 4000 Co Homogeneous Ni plated
after plg Cor 0.33 2.12 - 5743 5753 5854
3.57 3.47 3.53

395-6-7 21900 - Ni plated - 4000 Co Homog
Corrosion - rump on after plg wire - 6283 6253 6100
3.78 3.78 3.77

398-9-400 21670 Co plated - rump on after plg
Corrosion before rings put on - inner rings 4000 Co 4000 g
5844 5710 5648 -
3.52 3.46 3.43

401 21639 - 8000 Coffinite - 4000 g on Coffinite J -
rump on before plg - 5588 5648 - 5593 -
3.48 3.52 3.48

404-5-6 - Dup of 401 except 7000 Coffinite - 21900 gm
6365 6315 6230 -
4.06 4.05 4.00

407-8-9 Dup of 401 except 6000 Coffinite - 22140 gm
6290 6265 - 6137
4.11 4.10 4.07

410-11-12 Dup of 401 except 5000 Coffinite - 21631 g
5401 5590 - 5754
3.91 3.83 3.93

413-14-15 - Dup 401 - except 4000 Coffinite -
21700 - 5645 - 5645 - lost -
4.00 4.00

416-17-18 Dup 401 - except 3000 Coffinite 21650
5923 - 5761 - 5730 -
4.34 4.27 4.27

419	998	420	992	421	950	7812	2.13 Co
422	767	423	772	424	753	6216	2.08 Co
425	815	426	841	427	850	6215	2.33 Ni
428	837	429	850	430	837	6215	2.5 Co
431	776	432	812	433	837	6215	2.33 Ni
434	868	435	882	436	872	6216	2.32 Co
437	823	438	845	439	822	6215	2.43 Co
440	842	441	818	442	842	6215	2.41 Co
443	855	444	880	445	880	[illegible]	[illegible] Ni
446	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Reversal of Cathy
76 good each
Lost magnets
heard them
[illegible]

419-20-21- Disp 401 - Except 2000 Coffeh —
21615 — 6036 6132 6000
4.59 4.62 4.59

422-23-24 21745 - Co plated 9000 Coffeh 4000 g
phd within min plating after Cu strikings drying 10.62
Corrugated + rings fine
5880 6087 6163
3.68 3.81 3.85

425-26-27 - Disp of 423 Except Ni plated bars
21635 — 5707 5732 5877
3.56 3.71 3.67

428-29-30 - 21602 - 9000 Co 4000 g - Co plated
rings Dried before phy — 5450 5652 5507 - non rings
rings + rings phy 3.40 3.53 3.44
431-2-3 - Disp of 428 Except Ni plated T - bars Dried,
rings on before phy 21650 5160 5229 5240
3.22 3.26 3.26

434-5-6 21750 - 9000 Co 4000 g - Co plated T -
rings on before phy - bars - obtained 10 hours next 10 hours
Secondary 10 hours — 6304 6211 6385
3.94 3.89 3.96

437-8-9 - 21600 Co plated T - 9000 Co 4000 g
rings - 684 phy packed round inductor —
5525 — 5644 — 5684 —
3.45 3.53 3.55

440-1-2 21665 - 9000 Co - 4000 g Cu
Co plated T - rings - 684 phy - Cu Ni bars —
run 3 secs nickel then 3 secs Co —
5675 — 5684 5759
3.54 3.54 3.64

443-4-5 Disp 440 except Ni plated T
5854 5938 5902
3.65 3.71 3.70

446-7-8-9 50 —
468-452-473-455-450 — } finish 2.2 for years

451	807	452	830	453	797	6.15	2.4	Co
454	827	455	846	456	830	6.25	2.5	Ni
457	775	458	750	459	750	6.25	2.5	Co
460	835	461	895	462	835	6.19	2.46	Ni
463	812	464	822	465	833	6.37	2.41	Co
466	875	467	868	467½	845	6.37	2.51	Ni
468	832	469	855	470	868	6.17	2.4	Co

446-7-8-9 34 Cu-Ni part (cut pts. 250 ohm) —
C 88 — 5 90.194 — ok

451-2-3 21700 — 9000 Cu — 4000 glue — Co plated T
wrap before play — assembled with old wrap from 31 33 34
5490 5405 5596 —
3.43 3.56 3.49

454-5-6 Dup 451 except nickel plated T —
wrap from old 41 45 55 — 21600 ohms —
5492 5491 5447
3.43 3.43 3.43

457-8-9 21670 — less porous grain — 21600
9000 Co 4000 g — Co plated T — wrap on before —
5498 5433 5323 —
3.43 3.43 3.32

460-1-2 Dup 457 except Ni plated 22060
5573 6012 5784 —
3.50 3.78 3.63

463-4-5 Dup 457 — except 3500 glue
Co plated T 22000 g — wrap on 64 play
5554 — 5656 5624 —
3.53 3.60 3.60

466-7-8 Dup 457 — except 3500 g Cue Ni plated T
Thicker wrap before — 22000 —
5659 5630 5625
3.60 3.60 3.60

468-9-470 Dup 457 except 3500 g Cue
+ 7000 Co flakes — Co plated wrap before
22060 — 5434 5475 5568
3.67 3.68 3.77

474	829	475	817	476	802	624	237	Co
477	881	478	880	479	923	624	2.49	Ni
480	892	481	897	[illegible]	[illegible]			
482	845	483	825	484	812			
484½	862	485	872	486	832			

491 – Dup 457 Except 3500 gm – 7000 Coff
Nickel plated T – unrump on 6 – plg – Metawale

474-5-6 – 21600 – Reg yarn Co plated T – packed
vertical rump (trim) – larger rump put on after
remade ovals – 9000 Co – 4000 gm –
5697 5680 – 5659 –
3.55 3.55 3.55

477-8-9 – Dup 474 – Except Ni plated
Lathes – 21672 – 5799 5845 6097
3.62 3.67 3.80

480-1-½ Remnant 353 & 356 – Co plated
Ni good rump on before –
6003 5818 – [illegible] –

482-3-4 – Remnants 368 & 371 –
used to Dup 356 – rump CP Nickel –
rump on 624 – nickel plated –
5460 5521 5443

484½ 485-6 – remnants 371 & 374 –
Duplicate 368 – CP Ni rump Ni plated Lathes
rump 624 – Ralph Cutting Novelties
5956 – 5687 – 5690 –

487	872	880	855		64.3			
490	968	"	—	—	66.5			
491	930				70.5			
492	1023				73.			
493	768				60.8			
494	865	495	843		63.3			
496	950	497	922		61.9			
498	897	499	847	500	847	61.6	2.57	Co
501	847					61.9		

487-8-9 Remnants, 401 — CP Ni rings —
5.610 5.648 —

490 — Dup. 404 in Copeland tubes.
CP Ni rings — early runs mixed or Nickel tubes
5.710 —

491 Remnants, 410 — nickel tubes early CP Ni rings
5.430 —

492 — Remnants, 413 — CP Ni rings —
5.685 —

493 — Remnants, 350 — CP Ni rings
5.446 —

494 — Remnants 383 — CP Ni rings
5.714 — 5.669

496 — Remnants 365 — CP Ni rings.
Copeland T. — 5.722 5.690 —

498 — 21.705 — 90.00 Co 45.00 g Cu
CP rings on 864 for Copeland T.
Rudolph New Cutting irons 6.007 5.443 5.430
3.701 3.35 3.35

501 — Remnants, 359 — CP Ni rings
Nickel tubes —
6.741 —

502	872	503	850		624.5	2.15	Co	
505	877	506	507	850	624.5	2.15	Ni	
508	772	509	750	570	762	624	2.416	
511-	920	512	938		624	Gold plated Tube 2.52		

502-3-4 21710 — 9000 Co flake nat'l num 1500
Hydrogen 4000 g — Co plated
rings cp 624 pkg 5828 5684 5713
3.64 3.55 3.57

505-6-7 Dup 502 — Except Ni plated T.
5774 5769 5587
3.60 3.56 3.49

508 — 21600 — 9000 Co 4000 g
Copplated rings 624 —
50 Single T 5216 — 5138 · 5236
3.25 3.20 3.26

511-12-13 — Dup 508 except Ni plated T
6239 6131 — 5889 —
3.89 3.82 3.67 mistake 9 grams
probably doubled Temperature amount of hydrogen

Up to this point
Average burn net in Nickel plated
is 3.1560 in Cobalt plated pocket
is 3.1584
Multiplier for Capacity Cobalt Tubes
2.410 Nickel plated tubes 2.498

Burning Capacity for Ni tubes 889 —
" " Co tubes 863 —

514	845	515	817	516	780	521 [illegible] 5 [illegible] 50 [illegible], 523 2 [illegible], 524½ 2 [illegible] 520 OK 522 OK.
517	821	518	792	519	847	
520	742	521	655	522	682	
523	725	524	692	524½	665	
525	795	526	802	527	815	
528	750.	529	737	530	781	
531	822	532	815	533	813	
534	825	535	792	536	828	

514-15-16 21700 absorbed to 21720 9000 Coflake 4000 gl. Co plated tubes 250 mlgms Each cell of Silicate Potash.

517-18-19 — 21630 grm Drop of 514 Except Nickel plated tubes

520-21-22 21600 — Co plated, 9000 flake 4000 gl. 250 mlg/Aluminum Each cell —

523-24-24½ 21730 — Drop of 520 Except Nickel plated tubes

525-26-27 21700 — Co plated, 250 mlg Sulphate Copper

528-29-30 — 21600 Drop of 525 Except Nickel plated tubes.

531-2-3 21 — 9000 Coft 4000 f. Co plated rings on Bof pky 21% KOH, 250 mlg Bismuth Nitrate

534-5-6 — Drop 531 Except Ni plated tubes

537	816	538	836	539	775
540	875	541	888	542	900
543	750	544	745	545	821
546	855	547	850	548	812
555	801	556	835	557	796
558	868	559	870	560	862

537-8-9 Dup 531 Except 21% KOH, 250 mlg Manganate Potash

540-1-2 – Dup 537 – Except Ni plated tubes.

543-44-45 21655 Co plated 9000 Coffeeb 4000 glu – 250 Molybdenum oxide

546-47-48 – 21708 Dup of 543 Except Nickel plated –

549-50-51 – 21683 green 9000 Coffeebothm 20 4000 glu Co plated tubes 21% KOH 100 mlg Barium Hydrate 100 Mlg Calcium hydrate per cc of –

552-53-54 – Dup of 549. except Molybdenum tubes, 21600 green –

555-56-57 – 21720 Co plated, 9000 4000 – 250 mlg Antimony hydroxide –

558-59-560 – 21630 Same as 555 Except Nickel plated tubes

561	832	562	855	563	882	
564	850	565	867	566	883	
570	700	571	700	572	745	

561-62-63 21675 Co plated tubes 9000 & 4000
250 mlg Potassium Chloride -

564-65-66 - 21650 - Same as 561 Except
Nickel plated tubes -

570-71-72 21683 - Co plated tubes -
250 mlg - Gelatin -

573-74-75

643	700	644	795	645	797	
646	807	647	795	648	793	
649	850	650	800	651	831	
652	890	653	908	654	927	
655	915	656	840	657	865	
658	920	659	910	660	953	

643-44-45 21720 4000 Coflake 4000 glu
Co plated tubes - rings on Gelfoil pkg 100
Single Tamps

646-47-48 — 21700. Dup of 643 except
Nickel plated tubes.

649-50-51 21630 Dup of 643 - Co plated
tubes - 100 Double Tamps

652-3-4 21673 Dup 649 except
Nickel plated tubes -

655-6-7 - 21650 - Dup 643 except
75 Double T - Co plated tubes

658-59-60 — 21640 - Dup 655
Except Nickel plated tubes

661	841	662	905	663	878	
664	772	665	715	666	792	
673	895	674	922	675	612	5
676	1026	677	1032	678	1052	

661-2-3 21680 - Dup 643 - 45 single Tamps Co. plated tubes.

664-65-66 - 21600 - 4000 Coflake Thru 20 - 4000 - Glu M plated rings on before pkg 75 single T -

673-4-5 21650 # 4000 Coflake Through 50 mesh - 4000 glucose - Co plated tubes rings on before pkg 50 Double T -

676-7-8 - 21750 - 4000 Coflake Through 50 mesh 4000 glucose Coplated tubes rings on before pkg - 50 Double T

679	1023	680	830	681	923	

679-80-81 21685 Dup of 676.
Except 2000 Co flake thro 50 mesh.

685-86-87 - 21632 gram 2000 Co flake.
thro 50 mesh. 4000 gms Nickel plated
flat flake. 3.4 gram without Cracking -

707	720	708	867	709	800	
710	993	711	1023	712	1020	S. Water ~~[illegible] lost~~
713	935	714	921	715	825	

707-08-09 25485 : 9000 Co flake
Ino 20, 4000 glucose, Co plated tubes
rings on before pkg – 50 Double T – mix
Very wet and sticky too much absorbed
water –

710-11-12 – 21 — absorbed 24 hours
9000 Coff 9000 Glu Ni plated tube
rings on before pkg ?

713-14-15 – 21 — absorbed ammonia 24
hours 9000 Coff 4000 glu Co plated tube
rings on before pkg –

722	885	723	805	724	942
725	822	726	845	727	834
728	868	729	860	730	885
731	800	732	778	733	757
734	757	735	717	736	742
764	860				
765	845				
766	942				

722-3-4 21—— 9000 Cofl 4000 Glu
Co plated tubes rings on bzf pky soaked in
water without changing for 12 hours –

725-26-27 - 21720 - 9000 Cof 4000 g Co plated
Tubes 4000 Glu rings on bzf pky 50 Dark T
Run in 21% Caustic SODA –

728-29-30 21673 - 9000 Cof 4000 Glu Ni
plated tubes 50 DT Run in 21% Caustic SODA
rings on bzf pky

731-2-3 21630 – 9000 Cof – 4000 Glu Co plated
tubes rings on bzf pky Run in 15% Caustic SODA

734-5-6 21700 – 9000 Cof 4000 Glu Ni plated tubes
rings on bzf pky – run in 15% Caustic SODA.

764-5-6 21670 – 9000 Cof 4000 Glu
Co plated tubes – rings on bzf pky 50 DT
for opal tools.

S
1

752-53-54 21650 g. good Co fl Cake: Thus 20
4000 Glue Co placed tubes,
weighs as before pkg. 50 Double T
Run Cold in 21% KOH —

S
1

755-56-57 Dup of 752 - 21610 g
Th placed tubes

S
1

758-59-60 — 21650 g good Co fl Cake
4000 glucose Co placed tubes, weighs
as after pkg 50 Double T Run Cold
in 21% KOH.

761-62-63 — Dup of 758 — ixes of
Th placed tubes 21660 g

827-28-29-30-31 -
21640 green 9000 Coffeeke.
4000 active loaded fuel pkes.
34 arm Cakes
Cement load dried up pkes as bulk of
Mix too great, it feeds Fuel pkes
spaces left over ? ?

	Gold	100	200	300	400	500	600	700	800	
2	777	637	725	736	712	572	475	395		
3	732	—	732	745	726	652	585	532		
4	651	667	740	775	658	632	560	530		Ni flake
6	656	630	645	668	582	549	483	476		
8	717	775	665	670	572	482	400	402		
12	850	871	875	826	635	455	522	475		
24	786	862	873	687	647	587				Ni flake -

6190
247
2476

21000
9176
1824

6

6190
247
6943

619
247
6

6190
247
6943

21950
21000
9176
2774
21950
37530
21950
1897

21950
9000
3500
3750

21000
9176
1824
21000
9000
3500
3750

21000
9176
1824
21000
9000
3500
3750

604
1

21000
9176
1824
21000
9000
3500
3750

21950
9000
3500
3750

619
604
1

21950
9000
3500
3750

21950
9176
1824
21950
9000
3500
3750

619
6
3330
3750

21950
1897
1750
1897

21615
9000
3500
3750
3115

21615
9000
3500
3750

21950
9000
3500
3750

21950
9000
3500
3750

21760
4 hours
4 hours
3797

217900
2297000
21700
1

73

21670
4 hours
4 hours
3797

216500
2605000
19300
1

65.5

21900
7 hours
4 hours
3797

219000
1972000
21600
1

66.5

21655
9 hours
4 hours
3797

218500
2493000
19300
1

62.7

21615
4 hours
4 hours
3797

216500
2293000
20000
1

74.2

21639
9 hours
4 hours
3797

216390
2028000
1434300
1

64.3

21631
6 hours
4 hours
3797

216300
1997000
1

62.7

21670
9 hours
4 hours
3797

216700
2067000
1

62.5

221440
6 hours
4 hours
3797

221400
1932000
2177300
1

68.4

353
2.3
1.76
2.8
5.8
5.8
6.7
5.2
5.8
5.8
3.5
3.6
3.7

353
3.9
1.0.7
1.8.9
2.1.

3.8.9
9.7
2.7.2.8
3.5.8.2
1.0.6

5.9.7.0
6.5.3
3.7.8.1

1.7.9.1.0
2.9.8.5.0
3.5.8.2.0
1.8.9.8.4.1

2.3.0
3.6.3
3.7
0.6
6
3.1

3.8.9.8
1.1.3
1.6.9.4

2.1.7.0.0
1.9.7.6
1.5.7.8
1.9.5.3
2.1.0.7

3.8.9.8
1.1.7
3.9.8.5

3.5.3
2.0.4
2.6.3
1.7.0.0
2.9.3

3.8.9.8
3.7.8.1
1.1.7

2.1.0.0.0.0
1.9.5.3.2
2.0.5.3

3.6.3.9
1.9.1.7

3.6.3.9
1.8.8
3.5.3

2.8.0.0
2.1.0.0.0

1.0.0.0.0.0.0
8.7.0.0.0
4.7.0.0.0
(32.

	5th Cold	1½ hr Hot	110 Hot	150	200	
350	812	840	841	827	827	2000 green no absorption.
351	803	820	825	816	815	4000 flake thro 15.
352	806	832	837	825	822	" " "
353	908	927	943	930	932	No water absorption, flake
354	911	945	965	955	942	thro 20 mesh
355	880	910	935	912	919	"
356	912	912	886	870	895	"
357	860	880	875	867	868	"
358	885	892	892	862	857	"
359	850	850	840	815	812	thro 30 mesh green
360	900	890	887	877	860	thro 30 "
361	923	917	908	895	890	thro 30 "
362						
363						
364						
365	950	945	940	890	882	Thro 40 mesh green
366	931	925	915	865	847	Thro 40 "
367	943	917	900	850	832	Thro 40 "
368	898	865	850	807	800	copper thro 'Reversed'
369	826	835	842	813	815	Copper " "
370	897	865	877	846	817	Copper " "
371	875	855	865	837	820	"
372	850	852	850	827	821	Copper "
373	862	867	857	832	815	

Cut out, rumps heated when 1st put on due to Corrugating

	Cold	50 Hot	100 Hot	150	200	
374	855	860	867	847	840	
375	866	877	878	850	853	Rumps on after pkg
376	902	882	897	870	862	
377	925	920	917	903	910	
378	915	925	896	882	890	Rumps on after pkg
379	935	917	907	892	894	
380	850	886	907	887		Cor rumps on after pkg
381	900	900	822	535		Cor " "
382	852	900	882	626		Cor " " Cut out rumps heated when put on due to corrugating
383	883	895	888	882	870	
384	877	876	888	885	870	3500 glucose
385	883	876	900	892	882	
386	916	910	915	920		
387	933	925	942	932	897	2500 glucose
388	955	950	948	938	917	
389	882	902	890	891	865	Cor Rumps on after Cor
390	765	863	875	876	850	Cor "
391	850	887	883	888	887	Cor "
392	917	920	918	898	895	Cor "
393	870	875	880	860	850	Cor "
394	845	876	880	830	800	Cor "
395	896	940	770	927	918	Cor rumps on after pkg
396	893	942	940	925	917	Cor "
397	892	922	920	912	917	Cor "

		50 Hoff	100 105	150	200	
398	842	857	885	857	750	Cor rings or fin pky
399	820	855	846	755	642	Co "
400	810	855	852	745	685	Cor "
401	850	868	865	850	841	5000 Coflake
402	857	870	864	862	865	
403	840	857	878	862	855	
404	925	981	998	987	948	7000 Coflake
405	900	915	940	915	937	
406	932	925	940	915	890	
407	1000	957	992	952	943	6000 Coflake
408	843	862	906	880	886	
409	895	897	894	867	866	
410	906	925	904	890	895	5000 Coflake
411	893	907	884	845	817	
412	922	940	927	887	860	
413	856	892	865	825	772	4000 Coflake
414	936	915	885	808	750	
415	957	917	921	848	842	
416	927	940	912	770	747	3000 Coflake
417	902	917	877	770	747	
418	928	907	818	720	712	
419	993	780	697	602	592	2000 Coflake
420	992	815	663	572	530	
421	950	872	751	625	590	
422	761	855	875	837	696	Cor pkd without Plug-soaked
423	772	855	900	907	775	Co put in from Corrugated v. rings
424	753	900	918	863	731	Cor " "

		50 Hot	100 Hot	150 Hot	200	
425	815	865	886	800	877	Cor after soaking & dumping
426	841	887	902	832	890	Then [illegible]
427	850	905	900	830	851	
428	837	841	838		818	Mix dried before piling
429	850	865	868		840	Mix "
430	837	842	850		830	Mix "
431	776	801	785	787	752	Mix "
432	812	822	806	807	787	Mix "
433	837	835	817	815	783	Mix "
434	868	907	896	916	910	Slight rain in the night in the [illegible]
435	882	920	911	920	911	"
436	892	923	931	925	913	
437	823	843	843	837	817	Packed U shaped Tamping rod
438	845	870	867	858	841	"
439	822	842	857	870	865	"
440	842	845	847	857		Cutting from Forward
441	818	842	850	860		Completed
442	842	820	855	866		
443	855	862	875	885		Cutting from Rear
444	880	885	895	900		Completed
445	880	875	885	892		
446	468	490	492	485	428	filled place
447	450	487	450	442	400	
448	473	502	485	467	437	

X468 on 100 showed bad changed now then OK –

		90 Hot	Hot 180	1½ hr	200	
449	455	471	480	[illegible]	388	
450	450	487	470	[illegible]	393	
451	807	827	826	808	797	Compared with old mono
452	830	861	846	832	850	
453	797	846	843	838	812	
454	827	857	850	845	837	Dup 451 –
455	846	881	862	850	837	
456	830	835	833	822	827	
457	775	810	812	825	800	Less porous (Green)
458	750	810	800	808	785	21600 –
459	750	780	774	762	752	
460	835	857	830	816	790	Dup 457 but much more water absorbed
461	895	925	920	920	930	
462	835	886	871	863	875	22060 ?
463	812	843	840	832	817	Phenolic - 3500
464	822	871	858	847	820	Co plated
465	833	847	850	825	842	
466	875	871	868	850	838	Phenolic 3500
467	868	871	877	875	850	Nickel plated
468	845	871	850	853	825	
468	832	870 ?	840	877	752	Phenolic 3500
469	855	850	832	815	782	Nickle Co flake
470	868	887	886	856	812	Co platinit
471						
472						
473						

		50 Hot	100 Hot	150	200	
474	827	850	852	837	810	Oval rings —
475	817	835	840	537	805	
476	802	836	832	827	805	
477	881	908	905	900	875	Oval Rings —
478	880	895	905	906	902	
479	923	941	955	941	924	
480	892	897	907	[illegible]	903	Remnants 356 & 356
481	897	900	915	[illegible]	913	
482	845	843	843	[illegible]	831	
483	825	842	838	[illegible]	805	Remnants 368 & 371
484	812	837	834	[illegible]	838	
485	862	900	900	900	891	Remnants 371 & 374 Remnants
486	872	896	858	882	880	
	832	851	862	852	842	Duplicating 368 in part
487	872	893	891	880	844	Remnants 401 (in plate)
488	855	860	872	871	850	
489						
490	968	921	886	838	827	Dup of 404 —
491	935	900	866	800	786	Remnants of 410
492	1025	936	863	830	785	" of 413
493	768	800	803	805	783	Remnants of 350.
494	865	885	877	898	878	" 383
495	843	785	887	883	871	

April 5th 1906 —

Remark 1st run 50 Hot up to Nos 512
shows Highest.

940 — 7000 Co flake
935 Ni plated Corrugd rings after Cor
929 green thro 40 mesh
928 2500 glue ave
927 green thro no water exception
920 Ni plated Corrugd rings after Cor
917 Chgd 10 h rest 10 to low

This looks like 40 or 50 mesh 8000 or 9000
flake 3500 glue ave Ni plated
tubes Corrugated high pressure
rings put after Corrugating
& Charged 10 rest 10 chg 10 first 10 on
see increased Capacity & working 24 hours

		50 Hot	100 Hot	150	200	Remarks
496	950	930	937	908	900	[illegible] 364
497	922	891	872	853	827	
498	897	892	905	900		
499	847	850	865	852	822	new Cu flake from
500	847	847	841	825	807	
501	847	917	915	916	910	
502	892	892	900	885	860	Co flake
503	850	872	868	867	831	Co
504						
505	877	892	900	865	830	flake
506						Ni tubes
507	850	867	857	838	817	
508	772	765	787	755	737	Simple Tubes
509	750	767	767	727	710	Co plated
510	762	765	768	725	687	
511	920	930	955	952	950	Simple 50
512	938	950	945	933	910	Ni plated
513						
514	845	866	857	845		250 mesh Orifice after Pelletts
515	817	838	832	833		Tubes Co tubes
516	780	800	791	785		
						Dropped
517	821	847	830	830		Dup of 514 Ni Tubes
518	792	800	790	792		
519	847	847	840	842		

		50	150	150	
		697	697		
520	742		720	400	
521	652	572	335	190	250 mlg Aluminum Co tubes Tube surface [illegible]
522	682	732	380	267	
523	725	580	290	140	250 mg Aluminum Dup 520. ni tubes
524	692	572	425	146	
525	662	562	360	150	
525	792	830	835	840	250 mlg Copper sulphate, Co tubes
526	802	846	850	850	
527	815	845	837	840	
528	750	775	777	775	Dup 525 ni tubes
529	737	745	755	770	
530	751	806	800	802	
531	822	840	855		250 mlg Bismuth Nitrate, Co tubes
532	815	817	847		
533	813	840	850		
534	825	857	895		Dup 531 - ni tubes
535	792	832	872		
536	828	860	900		
537	816	875	900		250 mlg Manganous Potassium Co tubes
538	836	887	907		
539	775	842	847		
540	875	890	916		Dup 537 - ni tubes
541	888	897	917		
542	900	915	935		
543	750	800	807	825	250 mlg Lead Oxide - Co tubes
544	745	767	750	765	
545	821	813	780	792	

		Billet	100 Hot	155	
546	855	898	886	900	Dup 543 Ni tubes.
547	850	886	875	872	
548	812	886	868	875	
549	827	840	850		100 mlg/cmch - BaOH
550	812	800	856		+ CaOH.
551	827	855	871		G
552	882	885	910		
553	862	842	886		"
554	846	853	881		Ni
555	801	840	823	847	250 mlg Antimony Hydroxide
556	835	845	835	850	Co tubes
557	796	800	788	800	
558	868	877	880	880	Dup 555 - Ni tubes.
559	870	877	885	900	
560	862	896	886	885	
561	832	885	866	875	250 mlg KCl Chloride
562	855	891	881	885	Co tubes
563	882	912	903	910	
564	850	878	870	880	Dup 561 - Ni tubes
565	867	900	890	900	
566	883	900	890	897	
567					gathered
568					
569					

		50 Hot	100 Hot	150 Low	
					250 mg —
570	700	728	648	777	Hahn —
571	700	550	215	850	OC. tube —
572	745	700	521	740	
573					Thru 20
574					"
575					"
576					"
577					"
578					"
579					"
580					"
581					"
582					"
583					"
584					"
585					"
586					"
587					"
588					"
589					"
590					"
591					"
592					"
593					

		Stilet			
X 594 ✓					Ilus 20
X 595 ✓					"
X 596 ✓					"
X 597 ✓					"
X 598 ✓					"
X 599 ✓					"
X 600 ✓					"
X 601 ✓					"
X 602 ✓					"
X 603 ✓					"
X 604 ✓					"
X 605 ✓					"
X 606 ✓					"
X 607 ✓					"
X 608 ✓					"
X 609 ✓					
X 610 ✓					
X 611 ✓					
612 ✓					
613 ✓					
614 ✓					
X 615 ✓					Ilus 20
X 616 ✓					"
X 617 ✓					"

X 618 ✓						Thu 20
X 619 ✓						"
X 620 ✓						"
X 621 ✓						"
X 622 ✓						"
X 623 ✓						"
X 624 ✓						"
X 625 ✓						"
X 626 ✓						"
X 627 ✓						"
X 628 ✓						"
X 629 ✓						"
X 630 ✓						"
X 631 ✓						"
X 632 ✓						"
633 ✓						
634 ✓						
635 ✓						
636 ✓						
637 ✓						
638 ✓						
639 ✓						
640 ✓						
641 ✓						
642 ✓						

		Hot 50	Hot 100	Hot 150	
643	700	817	795	787	900 of 4000 g. Co tubes
644	795	815	802	795	ring on bottom flg 100 Double
645	797	825	820	820	Temp. –
646	807	855	866	850	Dup 643 except Ni tubes
647	795	845	866	860	
648	793	830	830	836	
649	850	877	891	891	Dup. 643 Co plated
650	800	837	835	836	100 Double T
651	831	825	877	872	
652	890	917	932	925	Dup 649 except Ni plated tubes
653	908	936	950	955	
654	927	950	940	950	
655	915	900	930	922	Dup 643 except 75 Double T
656	840	875	881	873	Co tubes –
657	865	850	895	887	
658	920	967	982	987	Dup 643 except 75 Double T
659	910	941	955	948	Ni tubes –
660	953	975	996	995	
661	841	903	915	912	Dup 643. Co tubes 75 Single T
662	905	906	930	921	Co plated.) –
663	878	905	907	912	
664	772	803	787	790	Ni plated Dup 661- 75 S T –
665	775	796	785	792	
666	792	803	795	800	

		50 Hot	Hot 100	Hot 150	
667					graphite.
668					Thro 20
669					"
670					"
671					"
672					"
673	895	882	885	885	Reg except 9000 flake. Thro
674	922	911	930	916	50 mesh
675	612	920	935	916	
676	1026	945	875	782	Reg except 4000 flake Thro 50 mesh
677	1032	976	890	817	
678	1052	930	762	737	
679	1023	662	565	550	Drop 676 except 2000 flake
680	830	630	520	550	Thro 50 mesh
681	925	617	442	442	
682					
683					
684					
685	461	357	362		
686	462	340	350		
687	413	337	360		
688	411	362	366		
689	452	352	747		
690					
691					

See notebook 715 and it must take.

Pumps busted on all groups.
water pumps ok swelled bad between
pumps or dynamo now. 712 let alone
2st — 100th Run.

	50	100 Hot 50	100 Hot	150 Heat	
692 v					
693 v					
694 v					
695 v					
696 v					
697 v					
698 v					
699 v					
700 v					
701 v					
702 v					
703 v					
704 v					
705 v					
706 v					
707	720	820	817	767	25485 absorbed 9000 flake 4000 g — Co Lubricant pump [illegible]
708	847	953	912	941	pump go OK. mix very wet
709	800	926	967	772	not tricky —
710	993	1060	1025	925	Run [illegible] green absorbed
711	1023	1056	1057	1025	water 24 hours.
712	1020	1065	965	791	Ni Lubr.
713	935	931	935	842	Run absorbed Nitr 24 hr
714	921	956	925	947	Co Lubr.
715	825	940	917	876	

		50	100	150	
716					
717					
718					
719					[illegible]
720					
721					
722	885	806	790	781	Soaked — H_2O without
723	805	821	805	821	Changing for 12 hours
724	942	857	807	775	
725	822	822	826		Cotton — Ring —
726	845	852	845		21% Caustic Soda
727	836	827	820		
728	868	867	848		Mutton —
729	860	860	857		Dup 725
730	885	915	887		
731	800	857	840		Cotton
732	778	800	812		Run 15% Soda
733	757	825	795		
734	757	835	825		Mutton
735	717	800	790		Dup 731
736	742	807	806		
737					
738					
739					

743 - started here on the 2nd large make of tubes after return from Fla — New flake 0001 thickness. Think it Dank as that previous in thickness & its as good quality. The only difference is perhaps the stick together little more in Hydrogen & somewhat more twisted by using the stirring rods in big pot, it dont appear to be as tough though I may be mistaken in this its very bright & good —

740 ✓							
741 ✓							
742 ✓							
✓ 743 ✓	795						Two 20
✓ 744 ✓	782						"
✓ 745 ✓	807						"
✓ 746 ✓	810						"
✓ 747 ✓	900						"
✓ 748 ✓	857						"
~~749~~							
~~750~~							
~~751~~			1000	150	200		
752	900	950	993		955		Cold
753	802	880	887		861		Co
754	815	925	938		912		
755	800	917	913		900	cold	Cold Co
756	877	967	980		972	"	
757	957	997	1010		990		
758	831	950	987		927	cold	Cold Co
759	832	918	940		903		
760	895	992	1000		967	cold	Cold
761	960	1030	1045		1040		
762	877	950	972		1000	cold	Cold
763	947	1025	1032		1017	"	Rungen after pkg

764	860				Req – for opel tools
765	845				
766	942				
~~767~~ no					
~~768~~ no					
~~769~~ no					
~~770~~ no					
~~771~~ no					
~~772~~ no					
773 v	842				Thru 20
774 v	825				"
775 v	872				"
776 v	900				"
777 v	855				"
778 v	882				"
779 v					Thru 50
780 v					"
781 v					"
782 v					"
783 v					"
784 v					"
785 v					Through 80
786 v					"
787 v					"
788 v					"
789 v					"

790 ✓	Thus 80
791 ✓	Thus 100
792 ✓	"
793 ✓	"
794 ✓	"
795 ✓	"
796 ✓	"
797 ✓	
798 ✓	
799 ✓	
800 ✓	
801 ✓	
802 ✓	
803 ✓	
804 ✓	
805 ✓	
806 ✓	
807 ✓	
808 ✓	
809 ✓	
810 ✓	
811 ✓	
812 ✓	
813 ✓	
814 ✓	

	Hot 50	Hot 100		
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27	518	507	490	
28	480	500	472	
29	487	482	468	
30	517	502	455	
31	432	465	430	
32				
33				
34				
35				
36				
37				
38				

837	Ilwo 2
838	"
839	"
840	"
841	"
842	"
843	"
844	"
845	"
846	"
847	"
848	"
849	"
850	"
851	"
852	"
853	"
854	"
855	"
856	"
857	"
858	"
859	"
860	"
861	"
862	"

863						[illegible]
864						"
865						"
866						"
867						"
868						"
869						"
870						[illegible]
871						"
872						"
873						"
874						"
875						"
876						"
877						"
878						"
879						"
880						"
881						"
882						Thirty 20
883						"
884						"
885						"
886						"
887						"
888						"

889					Thru 20
890					"
891					"
892					"
893					"
894					"
895					"
896					"
897					"
898					"
899					"
900					"
901					"
902					"
903	767				"
904	828				"
905	830				"
906	892				"
907	840				"
908	870				"
909					"
910					"
911					"
912					"
913					"
914					"

Separation of Nickel from Cobalt
to slightly acid solution of the two metals
add solution of Potassium Xanthate
wash by decantation, add Ammonia diluted
with equal bulk water, Thus dissolves
quickly the Xanthate Nickel leaving
Cobalt undissolved –
Thompson Chem News XXXV 270
XXXVI 150. Zn can also be separated
as a Xanthate

Separation Co & Ni from arsenic ores,
method using H_2S to remove arsenic –
peroxidize the solution precip by Na Carb
wash then add to moist precip strong
Sol Oxalic acid, in excess. Whole of
Arsenic & ferric ox passes into
solution, Mixed oxalates after thorough
washing separated by Ammonia
if any Co present it can be sep by metallic
iron before peroxidizing & precipitating by Na Carb –
Wohler Deut Chem Ber X 546 –

Zinc can be separated from Co by volatilizing of its Chloride,

Maybe switching in Erdmann's Ammonia Nitrites of Cobalt. They are the only known instances where Cobalt by Combn with Ammonia & Nitroxyl form an Electro-Negative radical

See 1st Vol 3rd Dupl p 557 in process work Cu which may be applicable to Wed — Bede Metal Wks Jarrow England

Try — Lelands Black Cupric OX obtained by precipitation, then reduced by Quicksilver that will not reduced CuO black made by dry way — perhaps precipitate $CuSO_4$ by KOH hot or with little H_2O_2

See if HCl passed into Acetone or amyl al will act on Ni Cu flakes to dissolve the Cu & not the Ni —

Perhaps anhydrous KCy in other solvents than H_2O for instance amyl alcohol, will dis Copper + not Nickel —

Possibly strips of flake Ni Cu as anode in KOH, in which KCl or Salicylic acid —
— the present will dissolve the Cu + plate over leaving the Nickel untouched —

1 = Test an iron pocket that has run a long time with a tube having Co flakes see if any Cobalt in the iron —

2 25% Sulphide Co 75 Sul 72 ignited & then Reduced by Hy probably Hy not necessary as Co will not probably oxidize Try with & with Hy — also pieces & run & green & run to chips Fe & then dry & Elect Electrolytic & prepare —

915						Ilwo 90
916						"
917						"
918						"
919						"
920						"
921						"
922						"
923						"
924						"
925						"
926						"
927						"
928						"
929						"
930						"
931						"
932						"
933						"
934						"
935						"
936						"
937						"
938						"
939						"
940						"

941	Thos Pope
942	"
943	"
944	"
945	"
946	"
947	"
948	"
949	"
950	"
951	"
952	"
953	"
954	"
955	"
956	"
957	"
958	"
959	"
960	"
961	"
962	"
963	"
964	"
965	"

966					Thro 90
967					"
968					"
969					Reg quite mix
970					"
971					"
972					"
973					"
974					"
975					Thro 90
976					"
977					"
978					"
979					"
980					"
981					"
982					"
983					"
984					"
985					"
986					"
987					"
988					"
989					"
990					"

991					Thu 30
992					"
993					"
994					"
995					"
996					"
997					"
998					"
999					"
1000					"
1001					"
1002					"
1003					"
1004					"
1005					"
1006					"
1007					"
1008					"
1009					"
1010					"
1011					"
1012					"
1013					"
1014					"
1015					"

1016					Thro 30
1017					"
1018					"
1019					"
1020					"
1021					"
1022					"
1023					Reg from mfg
1024					"
1025					"
1026					"
1027					"
1028					"
1029					Reg flat pk from
1030					"
1031					"
1032					"
1033					"
1034					Thro 30
1035					"
1036					"
1037					"
1038					"
1039					"
1040					"

1041	Thu 20
1042	'
1043	'
1044	'
1045	'
1046	'
1047	'
1048	'
1049	'
1050	'
1051	'
1052	'
1053	'
1054	'
1055	'
1056	'
1057	'
1058	'
1059	'
1060	'
1061	'
1062	'
1063	'
1064	'
1065	'

1066						Ilmo 90
1067						1
1068						1
1069						1
1070						1
1071						1
1072						1
1073						1
1074						1
1075						1
1076						1
1077						1
1078						1
1079						1
1080						1
1081						1
1082						1
1083						1
1084						1
1085						1
1086						1
1087						1
1088						1
1089						1
1090						1

1091	Thro 90
1092	"
1093	"
1094	Thro 20
1095	"
1096	"
1097	"
1098	"
1099	"
1100	Thro 90
1101	"
1102	"
1103	"
1104	"
1105	"
1106	"
1107	"
1108	"
1109	"
1110	"
1111	"
1112	"
1113	"
1114	"
1115	"

		Hot 50				Thro 90
1116						
1117						1
1118						
1119						1
1120						1
1121						
1122						1
1123						
1124						1
1125						1
1126						
1127						1
1128						1
1129						1
1130	853	893				1
1131	905	921				
1132	852	875				
1133	895	915				
1134	927	938				
1135	925	943				
1136						
1137						
1138						
1139						
1140						
1141						

		Kal 50
1142	792	867
1143	800	877
1144	887	948
1145	777	903
1146	840	928
1147	900	953
1148	870	920
1149	827	840
1150	906	903
1151	945	967
1152	927	961
1153	908	903
1154	770	887
1155	827	866
1156	817	850
1157	871	947
1158	858	938
1159	847	898
1160	772	822
1161	787	845
1162	776	816
1163	881	940
1164	890	960
1165	858	860

	b^4 Gl	Kof 50
1166	866	858
1167	815	800
1168	878	867
1169	926	950
1170	923	965
1171	947	972
1172	845	880
1173	908	900
1174	900	907
1175	943	937
1176	930	947
1177	891	900

18000 5000 mol - 6000 flk
42 16.4 20.6

180900
1620000

37%

352
4
1408

352
222
130

222

352
38
2816
1056
1337

352
37
2464
1056
1302

250
75
1250
1750
1875

Notebook, N-06-09-01.2

This notebook covers the period September-October 1906. Most entries are by Edison, although there are a few scattered notations by an unidentified experimenter. The book contains notes by Edison regarding the preparation of iron compounds for storage battery experiments. Some of the entries also indicate preliminary test results from cells using the iron compounds. In several entries, Edison notes the involvement of Otto Groethe. The front cover is labeled "Got all Runs Iron 2500 to 2850." The pages are unnumbered. Approximately 260 pages have been used.

IRON

William H. Haney
. . . STATIONER . . .
Good Work Promptly
68 William Street,
New York.

Sept 1906 TWG

2500 — 3 Iron flat pockets
1.825 grams Turnbulls blue
run with 4 nickels.

2501 1.791 grms

2502 1.805 grms

Soak in KOH 3 days changing KOH. 3 times, then send up stairs

After 1st change up stairs change the KOH after closing change KOH. Thereafter you need not change KOH.

2503 Iron pockets

Turnbulls blue roasted -
20 mesh after roasting
Wt 5.751 -
This is like metal Can't be
powdered.

2504 Same as 2503 but can
be powdered - not much metallic
Weight 5.251

To be put with 4 Nickel & Iron Reg

2505 3 Reg 4.5 vrons

Charge 15 hours regular
Then discharge - put in Water
equiv to Edison

Edison to soak in large
quantity water - then Ethyl.
then dry & recorrugate
250 atmos.

Run Reg after receiving
vrons from Edison

2506

2507

Mode

2508 Iron pocket filled with
Iron oxide made electrolytically
from Sulfide by Edison
250 almas Corning 100 smooth P
No Hg — 4 nickels —

~~Run regular & then test~~
for Economy

Mode

2509 – Two Iron pockets
pocket 1/3rd filled with reg
Iron mix – Then 50 mesh iron
screen nickel plated laid in –
then 1/3rd more iron mix –
another piece screen then
the other 1/3rd put in —
altogether 4.5 grms —

The screen should be cut
so ends sides will touch
the pockets — press regular
& Run Regular —

2510 ——

2511 = Dup of Ralph Abrogasti

No 6699 – 6700 – Charged
then discharged & put in
Water & grow Edison to
Soak out KOH & treat
with Ethyl Arecorrugate
to 250 atmos –

Then run regular

2512

2513 - 14

1335	1252
1375	1335
1392	1370
1217	1200
1205	1192
1208	1142
1435	1400

Don't know if [illegible] or [illegible]

2513 Remove from old iron plates Enough mix to make 2 pockets — Use plates from E 18 that have run long time + are dry — Repress + Corrugate 250 albums

45 Cakes —

Run Reg

2514

Made

2515 — 2 pockets

Containing Vanadium free iron - Hg but reduced by Hydrogen with a thick buffer of iron between Hydrogen & final iron oxide so the metal in buffer will combine with anything contained in the Hydrogen

Run Reg —

2516 -

2517 3 pockets 5 grms each
Vanadium pres now
Change then discharge
put in water + give to
Edison to take mix out
and dry -

2518 See next page

2519 -

2520 — 2 pockets.

Vanadium free now taken out of 2517 group — dried & pulverized fine & put in two pockets & repressed 100 smooth 250 atmos Compactg

Run Reg

2521

2522 = Pack one tube

with 200 mesh powdered
Sulphide of Iron – 150 Temps

Alternately Charge &
discharge 5 times Each
in KOH Changing KOH
Each time until its
Colorless on discharge

Then Use Nickel strip –

Then assemble with
4 Nickels Trim Rag

2523 = 2 pockets of Fe

Non pyrophoric Vanadium fizz
Iron - 4.5 gram Cake
Run req 4 nickels -

2524

2525 Dup of 2523

Except the iron has Mercury in.

2526 —

2527 2 pockets

Fe oxide plates made from Ferric oxide from Oxalate, moistened with minimum 21% KOH, moulded into cake with 300 atmospheres & then baked at white heat, put in pockets to make contact but not pressed in press

Run Reg 4.8 cells after heating

2528

2529 - Duplicate of 2527

but soaked in Nitrate of Mercury
by Edison after baking them
put in KOH soaked few minutes
then put in water for 2 hours
then removed in pocket
so it makes contact
+ without pressing in
press —

2530

2581 Dup of 2527

but dozen of the plates reduced to show water run in —
Then removed - allowed self heat & dried —

Assembled in packets to make contact but not pressed —
2 plates used
pressure balance in clamp bottle

2532

2533 - Dup of 2531

Except reduced so they are not pyrophoric - Run dozen plates —

Take 2 & assemble in pocket to make contact but not pressed in press

2536

2537 Two plates from

2533 — given to Edison to Sodium Amalgamate, wash & dry — assembled in pocket to make Contact but not pressed in press —

preserve balance — of Sound bath

2538 —

2539

Two plates made by melting 75 parts scale oxide of Fe with 25 parts Black Oxide Copper — make contact good

2540

2541

Make 1/2 doz plates
from melted scale oxide —
Cut to size & reduce in
hydrogen. run in water
make use of he at & dry

2542

2543

3 or 4 plates made from Melted Scale oxide of Iron — Reduced in Hydrogen to Non pyrophoric

2544

2545 2 Reg Gum mix in
iron pockets which have
not been nickel plated

2546

2547 =

Ferric oxide from precipitating $FeSO_4$ solution by ammonia. Wash dried steel moisten slightly. Then press into plate at 300 atmospheres, + ~~[illegible]~~ ~~[illegible]~~ then bake to yellow heat, put carbon pocketito make good contact but don't press in press

2548

2549 =

Same as 2547 —
but reduced in hydrogen
to Nonpyrophoric plate.

2550

2551-

Same as 2549—
Except amalgamated by
Sodium amalgam —

2552

2553

[illegible] ferric ~~hydroxide~~
~~ferric oxalate~~ prepared
by Coke using blender of
moist ferric hydroxide to
press 200 almost a Cake
to white,

2554

2555 - Dup of 2553

Except reduced with
to non pyraphoric

2556

2557 Regmix with Regular
pocket block not Rogers
filed burrs off —

Rem Reg 4 nickels

2558

2559=

Central core a perforated tube.
40/1000 dia - put in mould in which
we make the tubes - use hollow plunger
make central tube long so hold in
plunger act as guide - then pack
with regular Brown mix - take out
of mould & use central tube
as Electrode. Weigh the whole
tube & then weigh the piece
cut off this will give weight
of mix - assembles with
Nickels - Run Reg
Heat Zamony

ordered

2560 - 2 Iron Pockets
1 gram of Reg mix - filled up
opdec with glass of pocket
Laid in —
Run Reg test economy

2561

ordered

2562. Dup of 2560
Gert 2 gramines

2563

ordered

2564 Dup of 2560
But $2\frac{1}{2}$ grammes

2565

ordered

2566 Dup of 2560
But 3 grams

2567

Ordered

2568 Dup of 2560
But $3\frac{1}{2}$ grams

2569

Ordered

2570 Dup of 2560
But 4 grammes

2571

Ordered

25/2 Dup 2560
but 4½ grammes

25/3

ordered

2574 Dup 2560
But 5 grms

2575

ordered

2576 Dup 2560
But 6 grams
Use deep pocket

2577

2548 Dup 2560 ordered

But 7 [illegible]
Use deep pockets

2549

ordered

2580 Dup 2560

But 10 grammes
make Cake & use deep
pan & R.C.

2581

2582

Mould around a perforated tube 40/1000 dia Non pyrophoric Iron —/

2583

Take CP Ferric & wet with
Ni Sulfate & ignite = The Ni
so prepared as to give
30% of Nickel to 70% metal
Reduce the usual way + half
heat, don't use H

2584

2585

Reduce CP Oxalate by Hydrogen let in Water. Then add Hg

2586

2587

Ferric moulded with perforated sheet in Cautex —
Reduced by Hydrogen to
Non pyrophoric
Change hot 30 hours

2588

2589 =

Ferric Ox Waxed with
Ferric hydroxide as binder
pressed with Contrad
Peripheral ~~Pt~~ Pt Baked
212 or thereabouts —
Reduced to Non pyrophoric
state in Hydrogen
Charge half 30 hour —

2590

2591 Dup of 2589

Except reduced in Hydrogen
Regular + when left in
~~+ left heated~~ —

2592

2593 2 Reg pockets Fe

Charge 40 hours Take out
put in large bucket water
~~Charge~~ 6 or 8 hours
Then take out & expose to
air to self heat. dry furnace
at 212 or thereabouts not less
~~over~~ higher say 220 or 230
Then Recharge ~~+test~~ regular

2594

2595

~~I~~ one charged iron

Put one in porous cell with 33% the other in outside 21% — 4 volts difference of 6 Volts —

~~28~~

2596

Detts ~~Cine~~ Nickel plates under same conditions

2597 Run one charged iron & nickel. so Fe is up 33% & Ni up 21% — use 1/3rd reg discharge rate.

2598 Reverse rate as above + Run Che Ni up 33% & Fe up 21%

2599

Ferric oxide moistened with

Tungsten sulphide to give
10 or 15% Tungsten deposited
dried and mixed with hydrogen [illegible]
& put in packet 4/5

Running —

2600 2 Fr. s —

Take old packets, dip in some soap & Chloride from drug store 2 or 3 times. Then dip in 2% after drying — Wash out K Silicate — Dehydrate at 250 for 1 hr.

2601

2602 –

Neco pockets fresh req mix
dep in Conc Cellulose Wine – dry – dep in
21% ½ Wash & dry 30 Brim up to 250
½ Lb Rum Rad

2603

2604 =

Reg. was not run -

Dip on Cone Chl Fe clay-dep 21%
Lowest clay - clay first at 250 -
Rad dip on Cone feld - clay-dep
21%- lowest bring up to 250
1/2 hour

2605

No good nothing

2606 — 2 grams

Ferric from Oxalate burned
mixed with little KOH 21.0%
pressed 300 atmos with
1/32 hole nim screen cloth,
Reduced to non pyrophoric in
Hydrogen —

Run Reg —

2607

2608 – 9

357	442
450	540
435	515

2608 . 5 grms each ferric from
Vapree Oxalate, wet with 210/5
KOH, approved 300 atmos
into Cake with 1/32 hole
view screw — not Grat up high
with put right in water — think
too high spot. — Run req 4 weeks.
2609

2610. Try economy of F_2 without increasing in mix

2611 — 2 Grms

Containing 415 grms mix, having
20% of Copper in mix —
4% of Mercury

Test for Capacity & Economy Amp Hours

2612

2613 Dup of 2611 2 pkt.

But iron mix containing 30% of Copper - 4% Mercury

2614

2615 Dup. of 2611

Bud containing 20% Copper
+ 5½% of Mahaung

2616

2617 - Dup of 2611
But 30% Copper +
8% of Mercury

2618

Economy labels.

2619. 6 packets Rag mix 415

Put in this cell 250 Milligrammes of Bromide of Palladium with the Koff 21% 4 marbles

2620 Put in this cell 500 Milgrms Bromide of Palladium in the 21% KOH — 4 marbles

2621 Put in this cell 1 gram Bromide of Palladium in 21% Koff, 4 marbles

2622 ditto 2 grams Pot Bromide

2623 ditto 3 grams "

2624 ditto 5 " "

2625 — 2 pockets —

45 grammes Non pyrophoric iron — Charged 50 hours in 210% Hot 175 deg fahr — Then run regular Cold.

2626

2627 Size of Ralph was distilled
cooler to see if he at his work

2628 = Cakes made from ignited Oxalate. pressed 300 almost with minimum KOH 21% — Brot to a white heat soaked Conc Cu Sulfate & brot up to cohitish yellow — clamped to make Contact Charged 24 hours —

2629 Tungstic acid mixed
with Sulphate Co so 6s 50%
Tungsten metal 50% Copper
Ignited & Reduced in Hydrogen
to Non pyrophoric —
Fill Cup full by making Cake
Wt

2630 — Wt

2631 Cadmium. Oxide of
Sulphate Copper - ignited
aa 6z 50 parts Cadmium Metal
50 pts Copper metal
Reduce by Hydrogen
Cake + put in Cups
WP

2632 WP

2633 of 2 40 parts metal
60 " Copper
Reduced in regular way in
Hydrogen —
6.5. Cake

2634 —

2635 Dup of 2633
but · 60 Iron
40 Copper -

6.5 Cake

2636

Dup 2637

2637

60 Copper
40 Iron 5% Merc

6.5 Coke

2638

2639 - Deep 2633

60 Iron
40 Copper - 5% Hg
6.5 Coke

2640 -

2641 – 2

1085	1090	
1100	1060	
1030	977	
967	917	
1112	1083	
1143	1121	
1492	1490	
1380	1367	CO

2641 2 grids

Rabbit grits No 704 –

75% Fe
25% Copper – Reduced & Self heated

Nutty – 6 gram Cake –

Reg pressure – Run Reg

2642

2643 — 4 4

1100	1100	1095
845	825	800
665	665	645
117	108	109
92	96	84
84	84	92
735	732	740

Co

2643 - 3 Irons

Rabaquat No 706 6.5 Cake

50% Fe
50% Co Reduced + vacuum treated

~~No Bag~~ Run Reg

2644

2645

2646 = 2 gr-ds - 4.5 grm
Ordinary Reg Ferric from
Oxalate from Silver Lake
Reg prevs Return Reg

2647

No Current,

2648 2 grids 4.5 grams
Iron Oxide free from Va Wo Cr Mo
from Oxalate. 1st precipitation —
Press Reg r — Reg

2649 —

No Current

2650 – ~~Dup~~ 4.5 grms 2 grms Dup of 2648 but 2nd precipitate from Oxalate, press Reg Run Reg

2651 —

1	1155	1100	
2	990	930	
5	1083	1017	

Dallas

2652 – 2 Reg pockets 4+5
dry wet plates dipped
~~[illegible]~~ Ferric chloride soln 20
~~[illegible]~~ 10 mins – then dried –
then boiled 10 min 5% KOH,
then dried – peroxided out
on coater & Rem Seq

2653

1	—	50
2	120	285
3	265	460
4	167	396
5	500	817

Co

2654 = 2 pkts same as
2652 - but pkt mix dehydrated
Cog being kept 1 hour at 350 Fahr.

2655

1	1075	1100	
2	700	700	
3	635	670	
4	92	120	
5	121	975	
6	167	121	CO

2 pockets

2656 — RA, 150 706 - Iron
50% Cu 50% Zn No Hg rubbing H, soaffloat
65 gram CaK2 — regular press —
Corrugated 250 atmospheres
Run Reg — 4 Nickels —

2657

Curious Vine debatwork

No. Current

2658 = 2 packets -

4.5 grms -

Pzaw St Giles Oxide - gives some ferrocy reaction with acid & ferri -
Made from oxide precipted from pure sulphate by NaOH & boiled long time - gently dried - got by Dr G by accident, not by -

2659 =

2660 Dup of 2658

Except after making up in pocket dip for 5 minutes in Concentrated Sol Bichloride of Mercury — dry & then soak in hot 21% KOH, quart — then put ~~2661~~ in water 5 hours change water twice — dry & Run Reg —

2661

1	192	220
2	165	150
3	160	192
4	167	229
5	183	219

Co

No

2662 50% Fe 50% Cobalt

Made by RA. from moistening Ferric with pure Co Sulphate & igniting — Reduced by H & heated — Rum Red

2663

1	1860	1740
2	1462	1380
3	1760	1640
4	1433	1262
5	1392	1183
6	1345	1120
7	1400	1387
~~1358~~	1837	1725

2664 – ~~[illegible]~~ Dup of 2662 Except 5% of Mercury added

2665

1	1860	1740
2	1462	1380
3	1760	1640
4	1433	1262
5	1392	1183
6	1348	1125
7	1400	1387
8	1837	1723

Co

490 to grams of Fe

75
37 | 1837 (490
1800
37

2666 — 2 cups — 5 grams —
75% Fe 25% Bismuth, No 707 RA-
Reduced H + half heated —
Press + run Reg

2667 made

good Exam —

Note

750

1380 —

19°

1	1100	1080
2	1200	1200
3	1260	1260
4	1067	1071
5	1000	1050
6	992	993
7	1292	1255
8	1300	1300

Co

25 | 1300 (520
1250
50

520 MAH to gram Fe

2668 2 pkts - 5 gram
50% Fe 50% Bismuth
Self heating Reduced By H.
No 709 RA -

made

2669

870	860
1290	1400
1290	1400
943	1000
842	833
821	833
1270	1377
1300	1040

. Co

3 | 1377
459

4 59 MAH per gram Fe

2670 = 2 pockets . 5 grams
60% Fe 40% Copper
Reduced by Hydrogen Heated.
mixed 5% Mercury Oxide —
grew 1 mm of sq
made

2671

1	1170	1140	
2	1055	1050	
3	1080	1070	
4	1000	958	
5	1210	1183	
6	1117	1100	
7	1375	1295	Co
8	1242	1250	

Note going up when cut out

2672 = 2 pockets 5 grms –
30 Cu 70 Fe Red by H self
heated – 5% Hg mixed
Reg press Run Reg

2673 made

2674 2 packets for mix
Req mix (72) 5 grams
Same Req quote to Echson to be
tested for economy of Prod
4 ni

2675 = Each cell, 21% with
5 grms Chloride of Potassium

2676 Dup of 2674

Except 5 grms Bromide Potassium
Each dose

2677

2678 - Dup 2674
Except. 5 grms Iodide of Potassium

2679

2680 Dup of 2674

Except 4 grms Chloride of Potassium 2 grms Bromide of Sodium -

2681

2682 - Dup of 2674

Except 4 grms Chloride Potassium
2 grms Bromide Soda
2 grms Iodide of Lithia
in each cell ——

2683

2684 Dup of 2674

Except, 5 grms Arsenite Potash
Each Cell —

2685 —

2686 Dup of 2674

Except 5 grms Arsenate Potash

2687

2688 Dup 2674
Except. 5 grms Oxalate Potash

2689

2690 Dup 2674

Except 5 grms Bisulphite of Potash Each Cell

2691

2692 Dup of 2674

Except 5 grms Borax

2693 ~

2694 Dup 2694

Except 5 grms Formate Potassium

2695

2696 Deep of 2674
Except 5 grms Hypophosphite Potash
Each cell

2697

2698 Dup of 2674
Except 5 grm. Orthophosphate PO_4
Each cell —

2699

2700 ~~Dup of 2674~~

Except. 5 grms Ethylsulphite Potash
Each cell

2701

2702 Dup of 2674
Except 5 gms acetone
Each cell

2703

2704 – Dup of 2674

Except 5 gms formaldehyde
Each cell,

2705

2706 Dup 2674

Except 5 grms Silicofluoride Potash.
Each Cell.

2707

2708 Dup 2674

Except 5 grms

Sulphoarsenate Pa Cinch

Each cell,

2709

2710 Dump 2674

Except 5 grms Sulphide
Mercury Each cell

2711

2712 Dup 2674
Except 5 grms Hyposulphite Potash
Each Cell

2713

2714 – Dup 2674

Except 5 grms Sulphide Palmed
cobalt - C Pl —
Each cell.

2715

2716 Dup 2674

Except 4 grms Chloride Potash
& 3 grms Sulphide. Potash
in Each cock —

2717

2718 Dup 2674
Except 5 grms
Monochloroacetic Pdcrt

2719

1	1165	1140
2	1170	1170
3	1060	1100
	1127	1083
	1050	1053
	1167	1167
	x 1372	1372
8	1375	1317

Co

4 x 1372
348 Malt for grain fe

Note going up when cut out

2720 — 2 pkts
5 grams
Req prev Run Retg
80 % Zn 20 Cu
5% Hg added —

2721 made

1	995	837	
	1145	1023	
	1200	1100	
	817	800	
	937	704	
	833	983	
	1072	1000	
6	1250	1100	Co

625 Mash per gram Fe

2722 2 pkts –

5 grms 60 Copper

40% Fe

5% Hg Reg prices Reg prices

Ra 724

2723 made

Note – 625 Mash per gram Fe

1	900	970	
1	1000	1070	
1	1000	1100	
1	721	775	
1	654	733	
1	667	833	
1	1000	1150	
4	1000	1200	Co

2724 2 pkts
5 grms –
60 Copper
40 Zr no Hg
Ra 720 –
2725 made

1	1337	1300
	1200	1165
	1425	1370
	1167	1167
	1000	992

2726 2 plets

5 grams Reg non 15% HgO

press Reg Run Reg

2727 RA

Note bad effect

Excessive Hg

1	1310	1332	
	1145	1050	
	1355	1322	
	1150	1062	
	987	987	Co

2728 2 pkts - 5 grams
Reg now 20% HgO
Know reg run Reg

2729

Note bad effect
presence of Hg

1	1225	1242
	1085	1140
	1300.	1350
	1075	1117
	983	987

2730 · 2 pkts —

5 grms Reg Grad 25% HgO

preser Reg rum req

2731

720	792	
875	980	
1100	1100	
917	917	
838	871	

2732 2 pkts
5 grms Reg new 40% HgO,
press Reg Run reg
2733

1	967	1075
	950	1050
	1130	1192
	917	967
	833	833

C

2734 2 pkts
5 grms Reg now 30% HgO

2735 — Reg press run neg

1	470	490	
	795	795	
	925	957	
	767	754	C
	667	771	

As Bismuth is not so likely as HgO to come out perf Bismuth would be better than HgO

Tin probably better still if it well stand scorching

2736 2 pkts

5 grms Req now 50% HgO,

Press req run req

2737

Test

per gram Fe 15% Hg	
20	335
25	333
40	354
50	367
	383

Apparently this shows Mercury has a limit

This is not true with Bismuth

Bi 50 Fe 50 no Hg. 520
25 75 475 –

Contrary how it work with HgO added

1	985 857	987 867	

2738 2 pkts - 5 grms
RA No 731 = 30% Cu 70% Fe
self heated 4% Hg
press reg run reg
2739

1	1000 847	1005 455

2740 2 pkts
5 grms - RA No 730 —
30% Cu 70% Zn
8% HgO Self heated,

2741.

2742 2 pkts –
Drlg No 12 – 5 grms
Reg press run Reg

2743 –

gave order to Dr Gratke

make Ferric with following
Oxides by Soaking (Brew)

Nitrates in Ferric & equally

Co – Ni – Ce, Mn – Sb

Ti Wo, Cr Pb Cd Ur Mo
Sn,

These to go to Ralph to Reduce
& Test for Gent —

2744 2 pockets —

5 grms each —

Dr Gratke, Iron from Ferrocyk
fused with Carbonate,

Press Reg run Reg —

2745 —

No good
only 45 total to ✓
on 2nd Run CO –
130 strong

1	1245	1255
	690	695
	635	645
	625	637

Cd

2746 2 pkts.

5 gm [illegible], Dr g no 11

Reduced in H by RA & Reg amount

Hgo added – Self heated.

Reg press run Reg –

2747

1	560	560
	700	700
	665	665
	375	393

Run very close

2747 ½ 2 pkts. 5 grammes
Cobalt reduced by Hydrogen
self heated mixed in fCA Reg wt
14% HgO =
Reduced by RA = Reg pressure run very
RA No 732
Wt

2748 Wt

given to Harland to test
for ferrous Voltage etc

1	1080	1090	
	535	497	
	470	320	
	317	275	Co

2749 2 pkts

5 grammes Dr Gratton's No 14

Reduced by H, seed [illegible]

Mixed reg ammonia No 0 —

by RA, Reg prevent from reg

2750

2751 2 pkts -
5 grms —
Drg No 13 — Reduced in
H_2 5 deg heated — HgO added
deg amount —

2752

Oct 1906 —

2753 = 2 pkts -

Vanadium low ox 60

Copper Ox 40

Reduced H. red heat and 5% HgO -

2754

Conferval not recovered. Cell, will go to Vanadic acid & Cu SO4 — the 21% KOH

I

Therefore never got Vanadium ash not mixed with Cinder. Think Cu Oz Ox as producing permanently more Cu than above prescribed required —

Back step lowest Ox of V Cinder Cont that no Hydr. by the least amount of

Try with over 50% Cu in mix following Tungsten — the Cr. Mo oxides. Mo remains metal — also Cerium — probably the Copper & Hy dodge will increase their capacity

Oct 1 1906 -

~~1906~~ =

Make some iron oxide by following process —

Use iron anode in Ferrous Sulphate Mercury Cathode, deposit until it will just flow, withdraw & add fresh Hg — Spread Hg in warm place & let Fe self oxidize - Collect, add proper amt H_2O_2 and in pockets —

Or grow autoimpure Hg by Hydraulics & let it self oxidize, wash out Hg - & use the Fe oxide with proper amount H_2O

Think this process cheaper than Oxalate or Roasted $FeSO_4$ & Reduction by Hg,

1	240	177	
	330	350	
	465	565	
	450	575	
	496	625	
	640	785	
	700	895	
	790	1035	Co

Note going up when Co

2755 2 pkts — 5 grams
Cobalt peroxide mixture by Dr. G.
by Browning, (two 20 mesh —
Req. prem. run reg. of nickel,
Dr. G. No 20.

2756 —

1	1032	1052	
	1250	1250	
	1230	1272	
	637	696	
	84	558	
	1035	960	
	896	800	
	785	690	Co

Note Not reduced by Hg proper

~~1279~~ 424 with 600 grains

2757 – 2 pkts

5 grains –

60 pts Fe . 40 pts Copper both prec together on Oxalates & ignited – not reduced by H

Dr g No 22 – Prest + Sum 3 to 9

2758

Could take Red Fe & reduce Ag or Cu on it by Formaldehyde or Hydrosulfite & use it Raw, also Bismuth –

This might be a fine Exp't

NO Hg –

1	125	5c	
	125	160	
	506	410	
	242	237	
	250	250	
	540	540	
	545	430	
	500	450	Cd

2759- 2pts - 5 grm

Equal wts Cu & Fe dissolved in Nitric acid, evaporated & ignited -

Run x quartz Reg

Org -

2760

2761 2 pkts.

75 % 25 Bi reduced at self boiled & 5% HgO added —

2762

2763. 2 pkts

75 Fe 25 Cadmium —
Reduced by H self heated,
5% Hydrated

2764

2765 =

75 % 25 Tungstan,
Reduced by H and of [illegible] and
5% HgO added.

2766

2767

75% Fe 25% antimony –
oxidized → Cl, H, ~~and~~ heated
+ 5% HgO added

2768 –

2769 =

75% Fe 25% Tin -
Reduced by H and heated
& 5% HgO added

2770

Neverwas quite
finished this Run

2771 —

75% Fe 25% Cerium

Reduced by H + treated for a [illegible]

5% HgO added —

2772

2773 —

70% Fe. 25% Cobalt.
Reduced by H at 800° C for hours
+ 5% Hydrocarbon —

2774

2775

75% Fe 25% Ni
reduced by ~~H~~ self heated
+ 5% HgO hard dried

2776-

2777 -

75% Fe 25% Manganese
Reduced by H sulphuric acid
+ 5% HgO added

2778 -

2779.

98% Fe 2% Silver
reduced by H. sec of hand
+ 5% HgO added -

2780

2781 –

75% Fe 25% Vanadium –
Reduced by H_2 self has a [illegible]
+ 5% HgO added [illegible] –

2782

2783.

75% of 25% Uranium
reduced by H / self heated
& 5% HgO added —

2783.

2784.

75% Fe 25% Molybdenum
Reduced in H_2, dec of the acid
+ 5% HgO added

2785

2786 —

75% Fe 25% Bismuth seed alloy H
self heated + 10% Hg added —

2787

1	1310	1275	
	770	715	
	972	927	
	800	775	
	746	704	
	1005	905	
	1000	920	
	785	990	Co

2788 — 2 pkts

5 grm

Prem Delt Poles prep by Mr Off.
boiled 2 days in water
Reduced in Hydrogen self
heated & adds Req amount of
HgO

2789

1	512	535	
	425	450	
	517	577	
	500	550	
	608	662	
	742	800	
	775	835	
8	785	845	Co

2790

Dr Grathe No 16

Reduced by H, self board Cody & Req amount H g O added

2791

1	1155	—	
	900		
	980	—	
	667		
	617	—	
	550		
	615	—	
8	580	—	Cd

2791½ 1 pkt 4 nickel

Electrolytic now amalgam
Squeezed out in cloth in
Hydraulic Then acc to Cons
& Considerable Hg got out,

Wt 6.720 mix –

Stirred by self heating & then washed
in Water to get the Hg out,
Water filtered off & then
probably add Hg0 —

1	437	457	
	452	500	
	550	600	
	208	167	
	167	167	
	645	660	
	660	735	
8	660	720	Cd

2792 2 pkts 5 grms —
Dr G X024 reduced in Hydrogen
Deep heated 5% HgO added

2793

1 v

1

1387	1350
1450	1480
1485	1435
1023	1027
1033	1033
1372	1372
1345	1345
1215	1255

Not much variation

37) 1485 (424 Mat per prem
140
85
70
150

Try effect of Cold & Economy on this

2794 - 2 pkts

Dr Gradle No 27 - 70% 30 Cdn

Reduced 6 pkt a sec 6 Cdn

5% 1d gd

2795

1	980	980	
	1075	1100	
	1092	1135	
	208	979	
	250	621	
	400	582	
	500	995	C6

2796 2 pkes

Dr Gratten No 28
Reduced by H, self lin nCo E
5% H of O

2797

1	45	45
	60	75
	85	85
	75	79

2798 2 pkts

Dr 9 to 31 –

Rec'd Sept 10th 1869 (in acc.) for

Reg count Hg put with it –

2799

1	470	475	
	500	500	
	550	580	
	417	437	Co

2800 2 pts

Dr Gracilis No 30

Rec'd 6, 11 - Sent for [illegible]

5% HgCl

2801

1	40	—	
	30	15	
	15	15	
	12	17	Co

2802

Drug No. 29 —

Reduced Cuff oxychloride

5% HgO —

2803

1	0 5 10 4	0 5 10 4	Cd

1804 2

Dr Gr 32
Received by the Deaf hearted
Regiment 1790

2805

1	45	45	Co
	65	65	
	75	70	

2806 2pkts

Dr G 34 -

Reduced by H sulphuric acid

Mixed reg amount HgO -

2807

1	160	160	
	155	150	
	155	155	Cs

2808 2pkts

Dr G 33 —

Rec'd by H, acc'd & receipt

mailed rec'g acknowlmt 11/20 —

2809

1	1100	1092
	1195	1195
	1200	1192
	996	1000
	1108	1108
	1325	1327
	1400	1400
	1350	1335

2810 2 pkts

RA No 741 607z 40 Cu
Reload acc 8 H 10% 5%

2811.

995	940	
960	910	
1000	967	
896	833	
1075	1000	
1100	1060	
1145	1100	
1060	1040	

2812 2 pkes

Ra X0 742
70% 30 Cu Rolled Sheet
10% MgO -

2813

1	912	1127
	1082	1200
	1082	1215
	962	996
	1058	1108
	1185	1215
	1227	1290
	1180	1275

1	960	912
	1080	1082
	1080	1082
	954	962
	1058	1058
	1180	1185
	1220	1227
	1175	1180

Note only 2 grms Fe
613 matt per 5 5
gram 1 1

2814 2 pkes
Ra - 739 -
60 Cu 40 Fe
10% HgO - Reduced & ucefft.
2815

V

2 | 1227
613

1	1127	1110
	1200	1200
	1215	1215
	996	983
	1168	1083
	1215	1227
	1290	1285
	1275	1240

Note 516 Math
per gram of Iron
S S
1 1
See Ra 740 only
5 grams used
in Rocks

2816 2 pkes
Ra 740
50 Fe 50% Cu Reduced & Sep'd
10% Hg O

2817

Perhaps could put rsq Fe in
$CuSO_4$ or Acetate or some Copper
salt not forming a basic Iron
& self reduce the Cu on Fe
& use very little Cu & get big
results

2.5 | 1290
1250
4
2500
1500

1	1200	1150	1345
	1060	1025	1280
	1235	1165	1430
	1167	1033	1352
	1306	1183	1417
	1400	1330	1490
	1325	1425	1590
	1400	1300	1445

2818 3 Reg. Drm pockets 5 grams
3/1000 stock 2400 perforations bars inside

2819

2820

1	1255	1200	1190
	1260	1170	1167
	1405	1265	1285
	1358	1233	1217
	1442	1333	1317
	1445	1360	1350
	1555	1500	1500
	1450	1345	1335

2821 3 Reg iron pockets 5 grams

5/1000 stock burr ground 1/8 burr inside
2400 perforations cylinted

2822

2823

1	1170	1252
	1245	1300
	1355	1455
	1496	1383
	1362	1242
	1635	1555
	1495	1430
	1610	1545

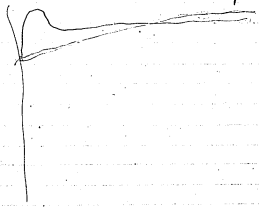
assembled with a
Ni tube & run as Call 2826

2824 2 pkts

RA 743 reduced & recf
heated. 10% HgO – 80% 20 Cu

2825

good Economy



1	995
2	1022
3	1145
4	1147
5	1153
6	1172
*	
57	1187
110 Run	1271
167	1217
219	1220
221	1185
275	940
381	797
434th Run	563
437 Run	657

Each Fe assumed with 4 new tubes
drawn as follows —

438th R	1508
439	1250
440	1387
441	2020
442	1930

Weight to be allowed

2826 — These are now 2666

2667 — Bi 25% Fe 75 c
with a Reg tube —
10 Coffeeley 24 green
cable wire —

~~Heat test~~ Reg 21%

Ni tube weight 6.745

1	1405	1400	
2	1400	1400	
3	1600	1665	
	1492	1533	
	1400	1400	
	1470	1500	
	1475	1600	
	1530	1600	
	1600	1590	
	1630	1770	
	1590	1685	
	1475	1479	
	1317	1321	
	1575	1655	
	1555	1545	
16	1500	1500	Co

2827

Bi gratho. 5% Bi 95% from precipitating Oxalates 5% HgO

G 35 - 5 grms -

2828

1	1535	1645
	1410	1482
	1640	1690
	1517	1579
	1417	1550
	1600	1590
	1567	1600
	1600	1655
	1230	1637
	1415	1722
	1500	1627
	1083	1177
	1175	1383
	1600	1780
	1425	1480
16	1500	1570

2829

Dr-J 36 = 10% Bismuth 90% Fe
ignited oxalates. 5% Hg S
5 grms

2830

1	1145	1145
	1220	1240
	1037	1100
	1000	983
	1054	1054
	1450	1485
	1432	1472
	1415	1450
	1480	795
	1492	970
	1477	1165
	1104	883
	1242	1067
	1565	1470
	1283	1250
16	1485	1362

C)

2831 5 gm

G 37 - 15% B1 85 Fe - precipitate oxalate, Reduce H, + 5% HgO and [illegible]. also [illegible]

2832

1	1062	1050
	1185	1300
	—	1227
	1467	1080
	1317	1292
	1600	1570
	1550	1557
	—	1522
	1490	1260
	1492	1430
	1300	1467
	1333	1083
	1300	1392
	1515	1520
	1465	1425
16	1490	1490

C.

2833 5 grm.

DrG 38 – 20% [illegible] 80.7%
[illegible] Oxalates, [illegible] A.
[illegible] 5% [illegible] 2000)

2834

1	825	845	
	640	662	
	502	510	
	400	446	
	433	458	
10th	205	152	
13th	250	250	Co

2835 Ra 746—

PH Ferrous hydrate—No washing, air dried (washed)— Reduced 5 H. 14% HgO.

2836

1	970	960
	960	1000
	1040	1080
	1196	1267
	1304	1333
	1377	1500
	1160	1215
	1255	1377
	910	1060
	1090	1222
	1270	1372
	1090	1067
	1250	1255
	1520	1565
15	1255	1300
16	1490	1492

Co

2837 2 pkts

Dr 9 39

25% Bi 75% Zn. Reduced by H

self heated. 5% HgO

2838

15

11.59	1370	1330
	1300	1257
	1320	1265
	1142	1125
	1125	1050
	1270	1200
	1310	1300
	1300	1200
	1300	1260
	1200	1160
	1355	1325
	917	833
	1046	1000
	1255	1020
	1300	1182
	1300	1175

2839 2 Buckets 5 gms

R.A. #759
88% Fe 12% Cu mixed 5% Hg_2O.

2840

145

1/	1965	1920
	1495	1475
	1590	1600
	1300	1192
	1300	1333
	1450	1452
	1440	1475
	1375	1385
	1700	1770
	1677	1677
	1650	1625
	1075	1125
	1400	1458
	1465	1413
	1500	1525
	1560	1560

2841 2 Packets 5 grms

R. C. 762

88% Fe 12% Cu mixed 5% MgO_2

2842

1240	1260	
1022	1060	
1270	1300	
1100	1150	
905	975	
1300	1360	
1150	1115	
1485	1500	
1362	1300	
1565	1580	
1255	1175	
1142	1133	
742	987	
1600	1700	Co

2843— 2 pkts -

75% Fe 25% Bi 5 gms

761 Ra

Reduced and fused 10% of Mgo

2844

1	1290	1292
	1060	1062
	1270	1272
	1205	1196
	1029	987
	1360	1330
	1195	1220
	1485	1390
	1300	1427
	1535	1530
	1300	1290
	1167	1146
	750	1183
	1580	1490

2845 2 pkts.
RA 760 —
757 2 2583 mixed with 5-/0 Hygo
Reduced half normal

2846

1.	925	927
	187	187
	190	190
	167	167
	196	196
	240	265
	300	290
	380	390
	417	440
	534	565

2847 2 pkts

Ra 456 —

Precipitated Ferric Sulphate. by NaOH — dried at high heat. Ignited by H 109

14% H_2O —

2848

985	982
212	220
210	230
217	242
217	233
315	380
354	370
400	427
342	362
457	500

2849 Ra 757
FeSO4 by MuOH, mix reg Hgo—

2850

Ferric from Oxalate –
Wet with water & pressed 800 atmos
+ Great white heat. Shrunk very much
Can be made flat hard to break

SiO_2 wet with KOH .21%
shrunk very little, Can be
put flat / hard to break.

Notebook, N-06-10-05

This notebook was used during October 1906. All entries are by Edison. Included are notes regarding the treatment of nickel-cobalt ores that contain arsenic, along with entries relating to the preparation of the metals for use in storage batteries. The pages are unnumbered. Approximately 20 pages have been used.

Oct 5th 1906.

Working Cobalt Arsenides + Wad

Realgar dissolves in Sol KOH.

Why not ignite roasted Co arsenide with S in excess + dissolve out realgar, or volatilize by heat,

Carb Soda to which sulphur is added mixed with Arsenide fuse, the Cobalt remains as Sulphide free of Arsenic Watts Dic — possibly charcoal should be added.

Roast + reduce to Speiss, put in boiling H_2SO_4 oxdze As to As_2O_3 which volatilizes leaving CoS or CoO.

Pass SO_2 Hot over powdered speiss. Realgar formed, ∴ S to Co 175 HU As_2O_3 1547 HU SO_2 710 HU.

Roast speiss to As_2O_3 pass CS hot, forms CO + COS or CoO,

Relative affinity of Sulphur for metals

Strongest
Palladium
Mercury
Silver
Copper
Bismuth
Cadmium
Antimony
Tin
Lead
Zinc
Nickel
Cobalt
Iron
Arsenic
Thallium
Manganese
Weakest

Try Speiss roasted in arc furnace, magnesium lining -

Try Speiss anode in in KS. also KS polysulf use Ni Cathode CoS + Realgar forms at anode, realgar dissolves in KS, possibly As also deposit at Cathode use Cloth bags -
Mud roasted & smelted to an anode & operations repeated till pure,

To separate Co from Ni ignite the oxides, dissolve out CoO by dilute H_2SO_4 in which NiO is practically insoluble -

Another way reduce oxides to metal dissolve out Cobalt by Cupric Sulphate - The Copper & Nickel left is melted to an anode & Copper plated out in acid solution -

Another way reduce to metal
& form anode | Mercury Cathode,
when Cathode loaded with Co Ni
to battery consistency - put in
shallow dishes & allow Co to self
oxidize & collect as formed metal
nearly all oxidized when Ni will
commence to oxidize -
Then Either allow Ni to oxidize or
distill off Hg in Vacuo & get
metal Ni -

Arsenious acid is reduced to metallic
arsenic in slightly acid solutions
by metallic Zinc. requires 1½ times
weight of arsenic according to Downs.
If the As is in form of arsenic acid
it throws down ferric arsenate instead
of metal,

Cheap Hydrogen Sulphide

Steam + SO_2 passed through furnace filled with red hot coke. SO_2 reduced to S by Carbon water forms H + CO the H + S combine. Coke is kept red hot by blowing air in intermittently as in making Water gas.

Also Producer gas from soft Coal passed over red hot pyrites, by action of S + Hydrocarbons HS generated.

Another Scheme action of CO_2 on Na Sulphide,

Hoffner says Arsenic in Cupric Chloride Solution is thrown down by Caustic Lime or Cu Oxide,

Impure Electrolytes purified thus -

Newark
Sulphates Cu Ni Zn Crystalized The Arsenious acid & H_2SO_4 are yielded on boiling mother liquor

Chicago
Bluestone crystalized out, mother liquor Evaporated This gives a mixture of Bluestone & arsenious acid, by using a minimum amount of water The blue stone dissolves leaving the As_2O_3

Perth Amboy
$CuSO_4$ Crystalized out - Mother liquor treated with Iron, Copper thrown down Then stopped The Mother liquor Contains Cu + 60% As_2O_3 sold for Ash green coloring matter.

Mansfield Germany
Arsenic deposited out of Co Ni Sulfates by Cathodes with density of 30 milamp per inch, The Sulfates of Co Ni are then crystalized out, any Copper in solution is deposited with the As as a sponge mass Cu then dissolved out by weak acid

Oxalic acid precipitates Co Ni Fe
from Sulphate Solution by adding an
excess of Arsenious ore

Arsenious A sol hot Oxalic
Separates out on Cooling -

As_2O_3 Easily Sol in Arsenite Ammonia
hot, 7 to 150 cent. Separates out on Cooling -

As_2O_3 Sol hot Oxalate Potash

Dilute SO_4 at 80 dissolves about
1¼ pts of As_2O_3 to 100 of Solution
at 185 deg Cent about ½ part to 100

100 pts boiling Water dissolve
about 10 parts As_2O_3 in 3 hours

Pass H_2S through heated roasted arsenides + Reduces the Co Ni to metal + Volatilizes the Realgar

Pass SO_2 thro arsenides unroasted + Volatilizes the Realgar - + oxidize the Co Ni. Then remove + put in Tower with 6 Q of times bulk of Quantity + pass H or Co reduce to metal then lead out Cobalt by Cupric Sulphate, when all out Continue treatment with air + Cupric Sulphate to reduce the Copper - Then Wash out the metallic Nickel

Roast ore dead until ~~all~~ a test sample all dissolves (14) all Co Ni - Then 1st Batch treat to saturation with dilute H_2SO_4 = Wash out + again treat with 1/2 or 1/4 portion till all Co Ni dis use this liquor on Batch No 2

wash out when saturated with Co Ni - & add fresh ~~[illegible]~~ Lot H_2SO_4 until all metal dissolved & liquor is saturated. Then add 1/2 or 1/4 portion of H_2SO_4 & dis all Co & Ni & add the liquor to Batch No 3. & so on - after several Batches have been worked

The Liquor from the several Batches crystalizes when they have crystalized out as far as practicable. Take the Mother liquor & evap down for a further Crop of Crystals & finally add this mother liquor to a fresh batch of ore & saturate ~~the acids with Co Ni & if~~ crystalize out the Co Ni & that evap the mother liquor to dryness & mix with Crude ore & roast to drive off the arsenic -

Redissolve all the Crystals & Crystalize 2nd time slowly
Dry Crystals in Centrifugal
Wash them with a little
Cold Wash Water —
Boil this wash water
down & put it in the
Leaching Solutions used
on fresh ore —

The pure Crystals are dissolved
in Water & Bi Cu^T first precip
by H_2S, filter & then throw
down Arsenic, boil & filter
~~add Co Hydroxide &~~
~~pr~~ ~~Co~~ ~~boil~~ to
~~Sol~~ ~~Ferric~~
Oxidize with Nitric, Hypo or
Chlorine, & add Ni Hydrox or
$Co(OH)_2$ to boil out Ferric —
After that what's —

Possibly add $Ni(OH)_2$ & boil
after Co is peroxided &
throw down all the Cobalt

or Evaporate the Sulphate to
dryness then roast in
furnace & distill off &
saved what acid can &
Reduce the mixed oxides
to metal & separate the
Co by Cupric Sulphate &
air, afterwards removing
the Copper by Cementing
the treatment. The Nickel
will remain metal &
Can be used at S Lake
The Co Sulfate is roasted
& reduced to metal &
fused to anodes,

Or what is ably better Seperate
the Nickel by crystalizing out
as Double Sulphate Ni+K
in hot solution -

Ignite the $CoSO_4$ + $KNiSO_4$
seperately - save H_2SO_4 from both
Salts & get oxides. The K from
the $NiSO_4$ K leached out
Reduce to metals

Sulphides of As more volatile than metal itself

H reduces arsenate lime to As metal which volatilizes

As volatilizes at dull red. visible in the dark

Arsenious acid which crystallizes from hot solution is a As_2O_3 white sublimed As_2O_3 is BAS_2O_3

Very finely divided As when moist or dry is pyrophoric

H dont act on Arsenic

As heated below red in KOH. forms arsenite K- + arsenide of K + liberates H.

With boiling H_2SO_4 arsenic forms As_2O_3 + liberates SO_2

With dilute Nitric forms As_2O_3 + liberates Nitric Oxide

Sb oxide is dissolved out of As_2O_3 by HCl if done carefully only little As_2O_3 is left out - CoPS HCl

Process

As_2O_3 when sublimed should it contain any Sulphuretted acid KOH & resublime —

A Boiling Solution of KOH when saturated with As_2O_3 + then cooled deposits the As_2O_3 Should be able to remove As_2O_3 from the ore this way —

As_2O_3 Solidifies at 218 Cent,

As_2O_3 in aqueous sol. Iron precipitates the As as Ferric Arsenite If HCl present the most of the arsenic escapes as Asthydrogen.

As_2O_3 heated with Lime resolved into arsenate of Lime. + sublimed Arsenic metal, Similar reaction takes place with Carb K, -

1 pt As_2O_3 dissolves in 7.72 pts 60° Fahr water – others say 1 to 12 with As_2O_3 in excess.

Arsenite of silver on heating gives off As_2O_3 + leaves a mix of Arsenate of Ag + metallic Ag

Arsenite of lead alone withstands a red heat without decomposition. + Arsenite of Hg is but imperfectly decomposed

Arsenic acid dis in 6 pts cold & 2 pts hot water.

Arsenate Ag dont dis in NH4 salts

AsH_3 = Arsenuretted H.
Gehlen + Bullnecke Killed 6 by accidentally inhaling it – has a most repulsive smell
Burns in air at yellow heat. Self burns like a gas + forms H_2O + As_2O_3
$CuSO_4$ absorbs all of the gas leaver pure H. Condensed in very slow. Yields

Tri-arsenide Cont

Realgar heated out control with air
volatilizes much below red heat,

Realgar burns in air to As_2O_3 &
SO_2 –
Heated with H_2SO_4 forms As_2O_3
& SO_2 –

As_2O_5 or As_2O_3 is never completely
precipitated from solution by H_2S. or
Alkaline hydrosulphides.
Can be mostly eliminated by
1st filtering liquid in a closed vessel
after saturation with H_2S, heat warm
gently several days –
2nd saturating it anew from time to time
because if not saturated the acid liquid
redissolves one part of the arsenic from
the arsenic sulphide.
3rd filtering the liquid from the precip
before driving off the excess of H_2S.

Trichloride Arsenic boils 132 Cent, Evaporates in air and temp, fumes, highly poisonous. –

Fluoride of Arsenic very volatile, boils 63 Cent. If evap in air As_2O_3 left behind,

As_2O_3 very soluble Ammonia when heated, in cooling almost wholly deposited as crystals As_2O_3 as about any NH4 (Basic salt above)

Acid Salt. Viscid mass settles bottom of liquid, agitation & warmth it dissolves. If the acid & salts crystallize out.

As_2O_3 dissolves easily in KOH, only slowly decomposes K_2CO_3 when heated,

As_2O_3 in excess dissolved in KOH. Cold. Only alkaline liquid formed. which dont crystallize

Process

Process

Sodium Arsenite, viscid yellow
Can be Conc to syrup — if has
excess Arsi, acid salt cant
be crystallized.

Magnesia absorbs the vapors
of arsenious acid passing
over it, without liberating As.
the compound only evolves
As when very strongly ignited.

Notebook, N-06-10-15

This notebook is a continuation of N-06-10-05. It was used during October 1906. All entries are by Edison. The book contains notes regarding the treatment of nickel-cobalt ores that contain arsenic, along with entries relating to the preparation of the metals for use in storage batteries. The front cover is labeled "Oct 15 1906 Arsenide Co process." The pages are unnumbered. Approximately 20 pages have been used.

Oct 15th.

So far all the experiments show that the following process for working Arsenical Cobalt Nickel ores will be successful.

Concentrate the ore by Wilfrey Tables or by fusion in a low melting point slag like glass + Carb Soda, Silicate Iron, etc.

Powder to pass 200 mesh roast long time at low temperature until all non Combustible as is volatilized

Put in Lead dissolving pans say 5 of them. Use 20% Sol H_2SO_4 Keep around Boiling point, pass liquid through the 5 Vats, letting it evaporate down hot till say Specs 1.40 Then Crystallize

When first lead pan well drains no more Co Ni Elc remove ore + make this pan No 5 instead of No 1 & put in fresh chlr ore, & Continue this indefinitely

After all crystals possible is obtained, again Evap Mother liquid & obtain 2nd Crop — after which Evap Mother liquid to dryness & roast off dull red, The Excess of As_2O_3 is driven off without decomposing the sulfates,

Exhaust this with water When all Co Ni removed roast residue with Charcoal + save the arsenic —

The Exhausted ore in first operation is to be reroasted & recharged in separate applus of lead pans

The Crop of Crystals are then to be recrystalized & finally washed with Saturated Sol at ord Temp of Co Sulphate & the Crystals dried on Centrifugal — The washing Solution to be used until it gets too foul & then recrystalized & milling begins Evap to dry & roasted,

The Sulphuric Solution is to have the Cu Bi Sb Ag as Ets thrown out by fractional Precip with HS or Na Sulfide — & Cooled —

Oct-19th.

Vat No 1 250 grms roasted ore on hot plate 10 am - 500 cc of Solution of 500 cc H_2SO_4 Conc in 2000 cc water - or 760 by wt to 2000
Temp about 170 Fahr -
Changed Solution into No 2 Vat at 2 pm -
+ added 500 cc of above Solution to No 1 -

At 6 PM. poured No 2 into No 3 and No 1 into No 2 + put fresh 500 cc SO_4 solution in Number 1

Note, nearly all the ore in No 1 dissolved, possibly 10% left.

Phenomenon - No 2 at 6 pm had its ore swelled up to 3 times regular bulk, so that it gave scarcely enough solution to cover ore in No 3. + when I put solution from No 1 in it it nearly fills vat to top, dont know cause of this

perhaps the Co or Co_2O_3 precipitated out & swelled the solution — after I poured the strong solution out I had to put water in twice to wash it, solution out but this did not reduce the bulk of the ore.
possibly the 2nd run solution will dissolve it & reduce bulk, it acted as if it absorbed water & left a hydrated residue which would account for the small amount left behind that would pour off or come out or wash out,

I leave the 3 vats — the night watchman will keep lights up to right level walk every hour during night,

at 9 30 am 20th act. poured off solution from No 3. + put solution from No 2 into No 3 – + poured solution from No 1 into No 2

No 1 disconnected only small amount of whitish material left probably 3 @ 5% of original —

No 2 + 3 now heating —

Remarks – found in morning that No 2 + 3 caked considerable on bottom as watchman didn't stir – in practice the ore will have to be stirred once an hour or so to prevent caking —

Also probably 1st liquid from No 1 going into fresh ore in No 2 must not be saturated but a little acid to prevent precipn + swelling of the ore in No 2

It looks as if the arsenic was precipitated out of the saturated solution from No 1 when it went on fresh ore in No 2 —

I notice No 3 has a large amount of white stuff which I presume is pure As_2O_3 from solution of No 1 + 2 =

Note the finally Exhausted ore from No 1 filtered + washed shows nearly white + this shows that it was well washed — This ore should be removed I think —

At 4 pm pumped off Solution from No 3 + put solution from No 2 in it = It fill No 3 up to Top = No 2 has hard Cake 1/4 thick over nearly whole of bottom Cake so hard had hard time get it off with

a chisel – This shows that ore must be stirred with hot every 1/2 hour or so to prevent caking – The caked stuff has probably not been acted on very well by acid –

The residue from No 1 from which water extracts scarcely ~~[illegible]~~ any Cobalt after once washing. Cold & then boiling weighed 14.578 grms of 6% of the Original amount 250 grms put in No 1 = Residue from No 2 weighs 70 grms, this is independent of what caked on bottom, this weighing water grms –

The amount caked on bottom No 2 weighed 102.640 grms had to get off with chisel & as hard caked as Portland Cement,

It looks as if the first charge of acid (10) 600 cc of Reg Solution will be saturated & should not be used on fresh

or but always the 2nd & those after, although a basic salt will come down & not be desirable —

Or perhaps a maximum amount of solution that will be nearly saturated certainly will know this say from 2 or 3 vats. & then add residue to 1 vat & put in a fresh solution that will become nearly saturated, & then save residue until enough to start a new vat & add another solution etc finally of necessary recovery final residue —

The liquid will be rather acid but the mother liquor can probably be nearly saturated by fresh ore & then all crystals possible abstracted & final mother liquor evapt to dry & redissolved

At 6 PM poured off No 3
it was fairly strong but
probably lost free acid
as I did not let it soak
long as was afraid heavy
it thru night for fear
Coking — There is a
big residue in No 3
shock looking —
but its bulking much
reduced by last dose

At 6 PM I put 500 cc
of Reg Solution on No 3
to leave cold all night
to see if I can dissolve
more of residue —

Also on the 102 grms of
stuff chipped out Coll.
of No 2 I put 250 cc
Reg Sol & leave cold
all night —

It may be possible one
Record box sample
of roasted ore was
poorly roasted (12)
the ore in No 3 —
Had 2 boxes roasted
on different days —
Residue in No 3 looks
black —

---

6 PM. No 3 has 500 cc fresh
" No 2 has the chipped
residue from No 2 with 250 cc
Solution —

1045 am 21st Sunday put No 3
+ 2 on hot plate,

Wt of residue from X03
182.365

Residue from X02 chipped
out + reexhumated,

Total Residue
X01 14.578
2. 70 000
3. 182 365
Chipped residue X02 34 252
301.195

After roasting Weight.
255 grms Lost 45 grms.

Wt brown

Soaked the reroasted residue in water 3 days or also hot for 6 hours filtered off — Not much came from it —

Put about 300 cc water on residue + added 25 cc H_2SO_4 — in lead vat hot at 210 gm —

Amount of Co in fresh residue rather small, 1/2 small Evap dish of strong sol liquor but was helped just deep color —

The amount of total Crystals 875 grammes —

The Wacker liquor dried in Evap dishes 3 days. After roasting weighed 1317 grams there was one dish full of liquor which without Evap was added in the stuff Evap was muddy —!

Therefore 0.80g would weigh before roasting, but should be only 30% was volatilized — the probability Excess of H_2SO_4 — the deficit is probably same

---

All but about 10 or 15 grms of the 317 grams roasted Mother liquor was dissolved in boiling water. This 317 grms is probably the salt $CoSO_4 \cdot 4H_2O$ which is formed when $CoSO_4$ came in put in strong SO_4 acid, & it was not arsenic — The evap. dish full of liquid poured off leaving solid from the 3 days. Dried Mother liquor after 24 hours dont evap. any, but a shiny white solid sublimes. The liquid is either H_2SO_4 + Arsenic acid or H_2SO_4 alone

Evidently the Mother liquor can be evap. dry the new

drying liquid poured off — & the dry part dissolved in water & recrystallized, without going to trouble to roast the whole. The mother liquor from this will probably have to go roasted. This will reduce the amount to go roasted very much —

I find that the water sol from roasted mother liquor contains very little arsenic but considerable black stuff by H_2S —

The residue not sol in water is all sol in HCl — & on precip by NH_4 shows large quantity iron & some Co. This can be saved until get large quantity & then dis in HCl or possibly H_2SO_4 & perhaps $\frac{1}{2}$ boiled out by precip with $NaOH$,

The mass of gummy stuff of Mother liquor that would dry is probably H_2SO_4 — Arsenic acid, arsenious & lime as when cool large part separates out as white shiny stuff — 1/2 of dissolves only of all — on dilution it dissolves nearly all — I am now passing H_2S after diluting with 8 to 10 times its bulk of water There aint much Co in it

After taking out very large bulk ASS dont seem as if there is any Co in liquor filtered this —

22 million CM $\frac{1}{1000}$ thick
1 layer –

136000 mlg inch

1 million CM $\frac{1}{1000}$
10 " $\frac{1}{1000}$ –

13,15

3

33 | 446900
330
190
165
250
330
17

270
270
189
540
540
27900 CM –
300
21870000

10 square $\frac{1}{1000}$ inch –

11 flakes thick

61

200 grams

136 mlg 1 flake thick

136 mlg

Have

7800
20
156000

136 | 1560 (11
136
236
136

Notebook, N-06-09-05

This undated notebook, which was probably used during October 1906, is a continuation of N-06-09-01.2. It was used by Edison and an unidentified experimenter to record notes regarding the preparation of iron compounds for storage battery experiments. Most of the entries also indicate preliminary test results from cells using the iron compounds. Several of the entries note the involvement of Otto Groethe. The front cover is labeled "Entered Iron 2851 to 4193." The pages are unnumbered. Approximately 290 pages have been used.

1	525	525
	500	492
	500	480
	237	237
	229	233
	484	470
	500	455
	490	435
	590	580
	665	585

made

2851 5 grms. of a mix compared
of 24 Reg mix. of 6 grms.
2852 Nickel flake - not rolled
just mixed

565	532
542	540
560	570
246	308
250	292
500	570
480	515
450	520
480	517
515	560

Made

2853 ~~Organic~~ —
Compound of a mix
of Reg 7/2 - 24 grammes
9 " Nickel flake
moistened slightly + rolled —

Wt 5.202

2854 Wt 5.186

1	770 8	635
	800	650
	925	700
	608	500
	650	533
	962	510
	948	760
	1027	900
	900	765
	927	510

Mod 2

2855 5 grains -
~~[illegible]~~ of admixture of 24 grains Reg
Fe mix - 4.5 grains Cobalt oxalate -
moistened slightly with water -
rolled

wt 5.140

2856 wt 5.195

1	690	410
	525	305
	500	290
	333	96
	300	84
	462	300
	393	230
	490	300
	100	200
	230	230

500 g

200

2 3 25 g

19 g

Made

2857 - 5 grams of Ra 759 -
2858 Gently 88% Fe 12% Cu 5% Mgo. -

Mix 20 grams of this with 7 grams Cobalt of Idaho - Dry. - or put in 5 grams in each pocket -

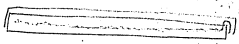
1290	1180
1262	1060
1312	1107
1227	1808
1167	1100
1450	1327
1325	1265
1457	1360
1500	1485
1565	1500
1445	1370
1250	1300
1383	1317
1550	1495

S

Mode

.2859 2 Fe plate Reg mix

2860 with ½ of the mix in then a perforated strip put on it then other ½ of mix put in pressed ref because the central piece is bolt are the inside perfect to insure contact



15

660	645
625	535
570	450
333	237
417	262
600	460
600	452
625	477
425	560
442	600

Made

2861 2 7% white reg mix

2862 8 gms Fe

2 " Nickle 1/2 reg thickness

Dry mix

15

1	750	690
	740	675
	710	630
	412	375
	512	592
	700	650
	690	652
	700	682
	440	685
	485	720

made

2863 2 Fe plates e.g. mix

8 grams Fe mix

2 " 1/8 sticks 1/2 ser thickness

moistened water

2864

1	1100	1000
	950	940
	957	900
	625	200
	417	658
	980	930
	945	860
	1055	935
	1100	1000
	1145	1030

2865 2 Fe spots rep mine

2866 9 grams Fe [illegible]

1 " Ni flake ½ sq thickness

Dry mine

900	990
882	950
890	970
850	600
600	733
875	885
990	940
865	1000
964	972
895	1000

2867 2 Fe pellets reg mix

9 grams Fe mix

1 " Ni flake ½ reg thickness

moist with water

2868

1570	1600
1300	1300
1500	1480
1217	1142
1350	1342
1400	1370
1572	1500
1572	1540
1700	1675
1700	1645
1540	1480
1354	1250
1375	1308
1555	1550

2869 }
2870 } 5 grms.

38 Drl.

20% Bi 80 Fe - non pyrophoric, 5% Hgo

8) 1587
198.5 1/8
198.5 1/8 100% Fe

1	1525	1517
	1465	1460
	1535	1480
	1133	1127
	1458	1296
	1545	1510
	1590	1590
	1432	1545
	385	360
	462	465

?

2871 No46 Dr. 9. 5 grams
2872

80 Fe 10 Bi 20 Sb.
5% Hgo — Self heated.

80
10
20
5
115 | 800 | 70%
805

3.5 grams

3.5 | 1522 | 435
40
12
10
2
14
5

435 Mol/per gram Fe

8	2492	1350
	290	220
	300	260
	233	217
	250	223
	255	245
	340	300
	350	300
	300	220
	256	232

?

2873 N042 Dr. 1.
2874

80 Fe
10 Bi
20 Molybdenum –
5% HgO –

Nonpyrophoric

1.	1510	1380
	122	100
	180	175
	147	167
	150	142
	230	240
	295	282
	382	385
	360	390
	400	455

2875 42 Dr. 9. 5 grm
2876 Seafhazard

80 Fe
10 Bi
20 Molybdenum
5% H_2O —

Molybdenum not given

1st

—	1557
196	2170
1695	1825
1833	2167
2000	1704
1858	1920
2025	2195
2050	1960
2010	2160
2000	1800
1775	1600
1417	1217
633	517
455	457
1590	2000
1325	1400
1212	1162
1325	1475
1355	1712
890	955 — What to Hold

Something wrong

512 Matt per gram Fe

2877 } No 40 Dr. J. 5 grm
2878 }

80 Fe
20 Tin –

5 - / - H_2O Self heated –

4 | 2050
512

Should try without

1	815	937
	1015	1120
	1245	1357
	1000	1158
	1129	1292
	1340	1470
	1390	1470
	1340	1430
	500	500
	555	585

} somewhere wrong
Date 7-7-94

2879 }
2880 } No 46 Dr. G. 5 grms

80 Te
10 Bi
20 Sb - 5% HgO

Non pyrophoric -

1.	1660	1545
	2145	1955
	2072	1787
	2145	1900
	1833	1900
	1800	1550
	2212	1900
	2055	1745
	2210	1780
	2090	1840
	1880	1650
	2196	1770
	1742	1733
	1835	1765
	2130	1900
	1815	1500
	1575	1468
	2055	1940
	2517	2460
	1675	1890

Something in Tin -

S

629 mat per gram Sb

2881 } No 40 Drg 5 grms
2882 } Non pyrophoric -

80 % 20 Tin -

5% HgO -

5% HgO -

1:115 [illegible] grams Sb

See Grathes book

4 | 2517 / 629

1537	1575
1437	1370
1675	1650
1442	1454
1625	1600
1660	1675
1790	1790
1780	1782
1950	1900
1880	1857
1832	1825
1633	1642
1692	1667
1800	1787

Runs more
even both pockets
alike than
any Iron
from 2500 to
This point -

Something in it

2883 1045 Dr 9 5 grms
2884

Nonpyrophoric

5% HgO - S

20 Stibnite

20 Antimony
80 Iron —

487 Matt grms Fe
Indirect

Something in it

4 | 1950
4 | 487

165	1682	1700
	1360	1347
	1540	1537
	1275	1263
	1400	1375
	1523	1510
	1670	1685
	1695	1740
	1735	1730
	1755	1770
	1555	1580
	1454	1483
	1517	1527
	1750	1810

Both pkts
Prem Eosin
Urs also

2885 38 Dr. 9. 5 grms
2886

Not self healed

No HgO — Non pyro

20 Bi
80 Sb

1	1885	1800	
	1800	1720	
	1700	1660	
	1450	1333	
	1354	1283	
	1670	1640	
	1645	1560	
	1625	1542	
	490	635	Reversed 15 hours at 400 ma.
	685	697	
	645	640	

2887 } No 45 Dr. 9. 5 gms
2888 }

8072
20 Sb
5% Hgo - Sedheadale

1	837	857
	800	800
	500	530
	533	546
	550	572
	800	833
	855	855
	845	872
	950	1000
	1000	1012
	855	870
	642	653
	658	700
	935	970

2889 Coch 2 tubes with Fe mix
& Ni flake
7 Parts Fe mix reg
3 " Ni flake ½ reg thickness
3½ lb weight auto machine
Dry mix

wt 11.495

2890 wt 11.360

1	1146	1130
	1125	1100
	1275	1225
	833	750
	1000	946
	1300	1260
	1300	1300
	1250	1200
	960	925
	1295	1150
	1000	950
	500	417

2891

784 Ra

5 grams

2892

1	1062	1042
	1125	1092
	1300	1160
	833	750
	950	883
	1335	1275
	1465	1290
	1300	1200
	950	850
	1170	1000
	1025	945
	512	383

2893
2894 Ra 783 5 grms

1	1250	1260
	1350	1347
	1345	1350
	1000	1042
	1192	1167
	1465	1460
	1515	1545
	1400	1450
	1300	1270
	1465	1420
	1325	1345
	950	492

2895
2896 Ra 786 5 grms

80% Fe
15% Cu
5% MgO

1	1192	1230
	1312	1352
	1300	1370
	833	864
	1067	1092
	1400	1467
	1510	1572
	1360	1425
	1210	1200
	1350	1352
	1200	1220
	550	500

2897
2898 Ra 785 5 gm

80 % Fe
15 % Cu
5 % HgO —

2899
2900 Dr Grolle No 40 5 grm

Dup 2899-2

80 % Zr 20 Tin 5% 66 gO —
Non pyrophoric
for Economy tests for Holland —
4 tubes

1	1350	1265
	1170	1075
	1270	1200
	1142	1133
	1167	1175
	1340	1340
	1405	1400
	1322	1300
	1472	1420
	1560	1600
	1445	1460
	1104	1187

2901
2902 R.A. 787 5 grams

1	1090	1100
	1200	1240
	1347	1355
	1292	1300
	1333	1355
	1500	1460
	1405	1440
	1480	1500
	1500	1470
	1650	1650
	1650	1655
	1000	1375
	1175	1177
	1725	1630
	1580	1577
	1512	1572

Reg'd 15 Hz at 400 ma

2903
2904 R.a. 5 grams

Soy beans then washed reduced & sifted mixed with 14% H2O

1	800	800
	650	652
	630	630
	654	654
	650	650
	955	940
	1000	980
	1025	990
	1200	1215
	1170	1165
	1175	1190

2905 R.A # 792 5 grams

2906 Selfheated

1	1140	1170
	1770	1732
	1800	1800
	1525	1583
	1500	1560
	1850	1830
	1760	1727
	1765	1770
	2095	2082
	1895	1885
	1700	1740
	1867	1821

2 pkts run close
1 ogalles

10 cut to 6 balls

2907 5 grams

2908 Sodium ferrous sulphate
exp scorted washed reduced
sediment & mixed regular

$5 \overline{)2085}$
417 milliff per gram

30		
40		1
25		
10		
17		1
30		
40		1
20		
30		
40		
48		

3 grams

2909 Ferrous sulphite prepd by
Slacked lime + lime exhausted
by water till nearly out
E.

1	1150	1125-
	847	810
	705-	690
	600	554
	517	450
	575-	640
	720	690
	750	700
	940	890
	800	510
	675-	465-

2910 5 grams

2911 51-9 not selfhinted
mixed 5% H_2O
Fe 80 Al 10 Pb 20

1	1200	1195
	1275	1245
	1100	1100
	717	658
	608	446
	1412	1275
	1132	1000
	1250	1150
	1370	1155
	740	775
	597	775

1	1142	1185
	1200	1260
	1400	1362
	1000	812
	596	742
	1325	1432
	1440	1500
	1545	1500
	1570	1465
	1382	1120
	1050	1200

2912 5g

49 selfheated

2913 mixed with 5% H_2O

$Fe_{80}Bi_{10}W_{10}O_{20}$

2914 5g

49 not selfheated

2915 mixed 5% H_2O

$Fe_{80}Bi_{10}W_{10}O_{20}$

1	990	1060
	740	762
	650	675
	467	500
	450	417
	615	650
	700	657
	700	730
	640	775
	370	445
	315	352

2916
2917 #51 g selfhicinted mixed. 5% Hgo

59

F=80 Bi 10 Pb. 20

1	300	285
	380	390
	355	400
	200	208
	212	167
	200	145
	185	135
	200	250
	40	25
	20	17
	12	15

Reversed 15H
400 mg

Bad

1	435	437
	500	530
	490	495
	417	417
	475	467
	347	335
	270	400
	285	260
	85	80
	25	15
	55	12

Rev 15H
400 am.

2918
2919 #43 g not selfheated 5g
mixed 5% Hg O
Fe 80% Vanad. 20

2920
2921 #43 g selfheated 5g
mixed 5% Hg O
Fe 80% Vanad 20%

1	962	680	
	150	180	
	137	220	
	167	283	
	208	333	
	357	497	
	475	626	
	600	715	Reversed
	655	400	15 H, 400
	600	650	
	570	647	
1	1600	2080	??
	300	300	
	255	460	
	333	527	
	387	571	
	745	930	
	900	1080	
	1030	1245	Rev 15 Hz
	1075	50	
	1000	1285	
	977	1300	

2922 # 48 g selfheated 5g
2923 Mixed 5% HgO
Fe 80% Molybd. 20%

2924 # 48 g not selfheated 5g
2925 Mixed 5% HgO
Fe 80% Molybd 20%

1	650	580	
	80	70	
	62	65	
	42	42	
	50	58	
	60	62	
	62	70	
	70	35	
	35	25	
	35	25	
1	240	250	
	20	25	
	25	25	
	17	34	
	35	40	
	25	65	
	40	64	Recd 15 hrs — 400
	15	35	
	20	40	

Manganese
Very bad ute

2926
2927 #44 g not sufficient 5g
mixed 5% H2O. Fe 80% Mang. 20%

2928
2929 #44 g Sufficient 5g
mixed 5% H2O. Fe 80% Mang. 20%

1	1350	1455
2	1075	1125
3	1242	1275
4	1083	1133
5	Se	1217
6	1550	1420
7	1530	1550
8	1550	1575
	1700	1725
	1617	1620
	1617	1637
	1250	1250
	1262	1215
	1680	1715
	1630	1615
	1625	1635
1	1415	1430
	1320	1315
	1670	1755
	1405	1425
	1487	1483
	Se	Se
	Se	1655
	1320	1590
	1750	1830
	1500	1580
	1505	1552
	1168	1262
	1193	1293
	1515	1600
	1500	1570
	1520	1522

Read 15 Hour
400 ma

to Holler

2930
2931 # 41 g not sulphurated 5g
mixed 5% HgO
Fe 80% Cu 20%

2932 # 41 g Sulphurated 5g
2933 mixed 5% HgO.
80 Fe 20 Copper

2g

1	1300	1250
	1435	1585
	1455	1140
	1404	1458
	1755	1800
	1750	1755
	1755	1730
	1462	1725
	1512	1512
	1885	1970
	1690	1620
	1300	1200

1	1487	1525
	2210	1845
	1760	1645
	2050	1683
	1975	1633
	SC	1720
	1710	1630
	~~1475~~	~~1700~~
	12250	1875
	1812	1812
	2285	2425
	2460	2550
	1460	2685

727 MaH per gram 72 Highest known

Think its the Tin Had a good

S Note

2934 478 Not selfheated
2935 Mixed 5% HgO 5g.

80 Fe 20 Wolfram — Non pyro

2936 50 G Not selfheated
2937 Mixed 5% HgO. 5g.

80 Fe 10 Bi 20 Sn

See Grade book Homemade

35 Fe 26 Sb (767)

2 4 3 2 2 1 0 1 2 3 1

Off the Tin

110 (727) 800 770 1 2 3 4 5 6

1	1635	1655
	1600	1640
	1580	1650
	1567	1575
	1667	1585
	1635	1637
	1540	1420
	1290	1280
	1175	1225
	1025	600
	1260	925
	1257	1055
	1165	985
1	1890	1900
	1885	1870
	2050	2075
	1958	2067
	1992	2050
	1795	1775
	1890	1900
	2447	2387
	2556	2650
	1643	1750
	2467	2390
	SE	2200
	1875	2300

Not Tin [illegible]

2938 47 g Self heated
2939 Mixed 5% H2O 5 grams

80 Pb 20 Wolfram
Self heated

2940 50 g. Self heated
2941 Mixed 5% H2O 5 grams

80 Pb 10 Bi 20 Sn

Chemistry Lab test

700 Watts per gram

about same
Non pyro as
self heated

1	1065	1077	
	465	482	
	555	587	
	525	500	
	560	467	
	920	920	
	830	777	
	847	710	
1	975	975	
	900	670	
	620	610	
	550	567	
	529	529	
	925	947	
	800	797	
	845	819	

2942 53B. Selfheated
2943 Mixed 5% HgO 5grams
FeSO Ba 10 Pb. 20

2944 53B, Not selfheated
2945 Mixed 5% HgO 5grams
FeSO Ba 10 Pb. 20

	220	235
	110	95
	120	115
	50	58
	62	50
	65	50
	22	20
	25	10

Chromium Rod
w 7/32

2946 56 g Selfhearted
2947 Mixed 5% H_2O 5 grams
Fe 80% Chrom 20%

1	835	1235
	97	60
	45	55
	58	42
	55	50
	30	45
	40	40
	25	42

2948 56 g Not Selfhearted
2949 Mixed 5% H_2O 5 grams
Fe 80% Chrom 20%

1	1100	1140
	385	400
	350	340
	280	390
	385	375
	200	250
	1275	1260
	477	470
	400	400
	320	285
	375	420
	325	365

Vanadium Steel

5g

2950
2951 #54 g Selfhearted
mixed 5% Hgo
Fe 80 Bi 10 Vanad. 20

5g

2952 #54 not selfhearted
2953
mixed 5% Hgo
Fe 80 Bi 10 Vanad. 20

1	450	410
	100	100
	40	50
	25	25
	30	5
	5	10
1	1025	925
	145	60
	30	20
	10	15
	5	10
	—	10

Manganese again
Bad

5g

2954 #55 g selfheated
2955 mixed 5% H_2O
Fe 80 Bi 10 Manganese 20

5g

2956 # 55 g not selfheated
2957 mixed 5% H_2O
Fe 80 Bi 10 Manganese 20

1	50	1337
	225	1660
	300	1595
	792	1567
	958	1492
	1485	1522
	50	1515
	1655	1500
	1617	1780
	1600	1617
	1612	1530
	1250	1181
	1300	1192
	1590	1500
	1500	1425
	1512	1460
		1492

1492 average

1	1630	1500
	1580	1500
	1470	1400
	1250	1125
	1267	1105
	1465	1427
	1435	1445
	1444	1465
	1727	1770
	1540	1510
	1480	1627
	1200	1000
	1050	1050
	1535	1592
	1400	1425
	1475	1461

Rec'd 15 H at 400

1406 average

2958 2 Pockets reg. iron mix S.J.

2959 Pockets Silver plated not.

2960 2 Pockets reg iron mix S.J.

2961 Pockets Copper plated

1	1555	1500
	1490	1485
	1600	1555
	1354	1300
	1379	1300
	1500	1452
	1455	1400
	1437	1390
		Revised
	1695	1655
	1477	1470
	1470	1437
	1125	1106
	1162	1162
	1500	1500
	1400	1400
	1460	1458
		1437 average
1	1485	1412
	1660	1560
	1490	1400
	1333	1292
	1442	1408
	1530	1535
	1512	1532
	1542	1555
		Revised 15th
	1867	1800
	1662	1604
	1605	1577
	1125	1206
	1250	1250
	1610	1632
	1485	1530
	1540	1500
		1487 average

2962 2 Pockets reg iron mix 5g

2963 Pocket Gold plated

2964 2 Pockets reg iron mix 5g

2965 Cobalt Plated pocket

1	1475	1440
	1520	1435
	1540	1440
	1487	1350
	1294	1206
	1600	1577
	1540	1455
1487	1440	1462

1421 average

2966 2 Pockets reg iron mix 5g
2967 Tin plated pockets
Cobert Ray

1	1425	1435
	1350	1385
	1245	1390
	1381	1231
	1187	1100
	1545	1500
	1480	1430
	1400	1390
	1525	1680

1397 average

2968 2 Pockets reg iron mix 5g
2969 Cadium plated pockets
Slightly better than Ray

1	1800	1845	Again Tin shows up good.
	1590	1592	
	1640	1635	
	1375	1256	
	1287	1175	
	1576	1565	
	1500	1480	
	1465	1430	
	1690	1680	1517 average
1	1440	1440	
	1385	1340	
	1460	1465	
	950	843	
	856	775	
	1460	1467	Plots run close
	1465	1465	
	1465	1450	1231 average

2970 2 Pockets reg Fe mix 5g

2971 antimony plated pockets

2972 2 Pockets reg Fe Mix 5g

2973 Bismuth plated pockets

~~Slightly better than reg~~

2974 2 Pockets reg Fe mix 5g
2975 plated pockets

~~Sugar~~

2976 —

24 parts of 2883 Iron mix
10 Cobalt flake you need not
adjust but let it go just as if it
was green — pack in Nickel
tube pkg machine — 3½ wt
4 Ruip —

Only one tube —

	652	655
	650	647
	655	645
	575	587
	587	587
	560	550
	567	534
	1000	985
1	1105	1055
	810	772
	925	910
	650	656
	637	668
	1120	1117
	1090	1070
	1230	1193

6

2977 #65 g Selfheated
2978

Reduced + Selfheated
mixed 5% HgO

80 Fe
15 Cu
2 ag

2979 #65 g not selfheated
2980 Reduced & not Selfheated
mixed 5% HgO

80 Fe
15 Cu
2 ag

1	1370	1387
	1400	1360
	1475	1480
	1481	1481
	1050	987
	1955	1815
	1800	1885
	1920	1935

552 Milligram

Tin organic

S

552

3.7%	1935	552
	1935	
	1875	
	1750	
	1	

1	1107	1100
	825	1090
	1027	1222
	700	1281
	706	1000
	1250	1622
	1367	1775
	1452	1875

2981		#619 Selfhydrated
2982	70 Fe	Reduced + selfhydrated
	30 Sn	Mixed 5% 1g0

2983		#619 not selfhydrated
2984	70 Fe	Reduced + not selfhydrated
	30 Sn	Mixed 5% 1g0

1	1140	1125	
	740	740	
	680	675	
	768	787	
	812	900	
	1320	1355	queering up
	1410	1455	
	1535	1600	
	900	990	
	925	875	
	937	880	
	580	412	
	575	387	
	1135	930	
	1035	840	
	1112	812	

2985		# 60 g calcinated
2986	75 Fe	Reduced + calcinated
	25 Sn	Mixed 5% HgO

2987		# 60 g not calcinated
2988	75 Fe	Reduced + not calcinated
	25 Sn	Mixed 5% HgO

1	1240	1210
	1310	1297
	1280	1270
	1037	1141
	1062	1112
	1580	1587
	1315	1300
	1395	1350
	380	390
	870	877
	1010	1017
	525	543
	512	525
	1030	1015
	1040	1045
	1135	1115

Going up

2989		#57 S Sulphiated
2990	95 Fe	Reduced + Sulphiated
	5 Sn	Mixed 5% H_2O

2991		#57 not sulphiated
2992	95 Fe	Reduced + not sulphiated
	5 Sn	mixed 5% H_2O

485	480
607	620
1130	1255
493	850
750	818
1325	1412
1510	1595
1715	1710
1190	1235
1517	1770
1832	1990
1437	1475
1362	1500
2057	2072
1940	1950
1860	1865

[illegible] up [illegible]

[illegible]

5 2072 [illegible]

2993 Ferrous Sodium Sulphite
2994 not sulphated mixed 5% H_2O

2995 Ferrous Sodium Sulphite
2996 Sulphated mixed 5% H_2O

2995 $\frac{1}{2}$ Theo is 2995-6 - put upwell
2996 $\frac{1}{2}$ 4 ml tubes 2 put on hot
test - ~~[illegible]~~

L	927	847	
	965	937	
	945	897	
	1112	637	
	700	575	
	1165	1052	
	1220	1085	gone up
+	1340	1140	
	1145	1187	
	850	960	
	950	1095	
	525	625	
	500	600	
	967	1085	gone up
	1080	1200	
	1095	1240	

2997 90 Fe #58 ~~g~~ not selfheated
2998 10 Sn Reduced mixed 5% H_2O

2999 85 Fe #59 ~~g~~ not selfheated
3000 15 Sn Reduced + mixed 5% H_2O

1	1315	1385
	1410	1435
	1645	1700
	1587	1706
	1150	1206
	1550	1700
	1645	1740
	1960	2000

70 mp big

625 Neathquarth

320 | 2000 | 1920 | 80 | 64 | 16

1	1757	1842
	2225	2242
	1925	2080
	1431	1656
	1193	1462
	1595	2005
	2000	2050
	1860	2085

Neathquarth

641

320 | 2085 | 1920 | 165 | 128 | 37

3001 #62 g not sulphiated

3002 65 Fe Reduced + not sulphiated
35 Sn Mixed 5 % 14 g.o

3003 #62 g Sulphiated

3004 65 Fe Reduced + Sulphiated
35 Sn Mixed 5 % 14 g.o

1	1615	1660
	1505	1375
	1380	1415
	943	1125
	950	1125
	1520	1635
	1505	1625
	1650	1674

gaseous

45 | 1675 | 1372 Mallinckrodt
1325
3375
3150
1700

1	1916	1600
	1595	1560
	1682	1490
	1250	1112
	1250	1125
	1640	1695
	1640	1775
	1695	1815

cap

425 | 1595 | 445 Mallinckrodt
1700
1995
1700
2700

3005 90 Fe #58 S selfheated
3006 10 Sn Reduced + selfheated mixed 5% H_2O

3007 85 Fe #59 S selfheated
3008 15 Sn mixed 5% H_2O

620	635
583	605
590	635
550	600
500	537
640	725
900	980
1020	1115
2030	2090
885	885
887	887
550	562
612	618
980	965
1000	1025
1000	1035

3009 80 Fe #66 g reffreated
3010 15 Cu mixed 5% HgO
5 Cr

3011 80 Fe #66 g not reffreated
3012 15 Cu mixed 5% HgO
5 Chrom

965	962
785	950
1275	1277
725	925
912	906
1475	1710
1525	1765
1580	1785
1540	1577
1650	1645
1585	1600
1206	1250
1175	1225
1580	1600
1595	1565
1605	1570

3013 80 Fe #63 g not selfheated
15 cu Reduced + not selfheated
3014 5 gm 5% H_2O

3015 80 Fe #63 g selfheated
15 cu Reduced + selfheated
3016 5 gm Mixed 5% H_2O

825	825
737	715
840	800
600	575
600	562
1075	990
1160	1025
1265	1100
810	752
305	290
340	335
181	225
275	325
555	477
642	570
630	560

9" up

3017 80 Fe #68 g not sulphurized
3018 15 Cu mixed 5% Ag2O
5 Sn

3019 80 Fe #64 g Nin pyrophoric
3020 15 Cu with 5% Ag2O
5 Mo

Improved after resuscitation from 1500 to 1750
1575 1850

1	880	800
	215	200
	250	225
	187	162
	212	200
	410	330
	455	365
	445	370
	625	595
	1460	1470
	1475	1520
	806	925
	875	1025
	1475	1545
	1490	1585
	1500	1595

improved

n 1595 / 532 weight gain

3021 80 Fe #64 g Non pyrophoric
3022 15 Cu no Hgo
5 mo

3023 60 Fe #69 g Non pyrophoric
3024 40 Cd with 5% Hgo

1	842	815
	1280	1300
	1350	1430
	725	875
	856	987
	1555	1650
	1420	1535
	1350	1505
	1035	1055
	665	665
	730	720
	612	587
	662	618
	800	785
	855	840
	865	865

7 / 1670
550 neat per power

3025 60 Fe #69 g Non pyrophoric
3026 40 Cd No Hgo

3027 80 Fe #68 g sulphurated 5% Hgo
3028 15 Cu
5 Sn

Improved after reversal from 865 to 1400
865 to 1450

1	1282	1345
	955	990
	980	1035
	568	650
	662	750
	1005	1055
	1005	1070
	945	1000
	1370	1365
	815	770
	837	775
	500	475
	570	562
	880	840
	865	860
	825	822

3029 Ferric amon Chloride 5% Hgo
3030 selfheated

3031 Ferric amon Chloride with 5% Hgo
3032 not selfheated

Improved after reversal from 825 to 1160
822 1137

537	500
525	505
520	500
437	400
464	456
625	585
625	600
710	675
355	380
350	370
430	475
300	300
350	337
640	650
620	615
722	700

3033 cupric Ferric sulphate with 5% H_2O
3034 selfheated

3035 cupric Ferric sulphate with 5% H_2O
3036 not selfheated

1	1340	1305
	735	745
	755	755
	475	450
	515	500
	770	760
	800	840
	712	822
	785	820
	510	550
	530	560
	362	437
	437	531
	730	840
	827	925
	822	837

going up

3037 Ferric Potass Chloride with 5% H_2O
3038 not affiliated

Improved after reversal from 812 to 1087
722 1085

3039 Ferric Potass Chloride with 5% H_2O
3040 affiliated

Improved after reversal from 822 to 1025
837 1155

500	530
375	420
360	440
225	275
18	356
515	625
575	640
405	605
970	900
700	670
630	622
312	275
393	362
765	700
940	700
630	635

3041 Ferric Magnesium Chloride
3042 with 5% H_2O selfheated

3043 Ferric Magnesium Chloride
3044 with 5% H_2O not selfheated

1	625	650
	720	765
	800	875
	775	825
	687	700
	612	537
	640	562
	440	395
	380	385
	295	280
	245	235
	225	231
	175	175
	215	218
	260	265
	285	275

3045 5 grms
3046 83 Dr G - 90 F_2
10 Cerium -
Selfheated 5% HgO

3047 5 grms
3048 Dr G - 70 80 F_2
20 BaO
Selfheated 5% HgO

1	315	300
	375	360
	535	530
	508	600
	356	343
	396	362
	800	637
	480	382
	800	885
	315	410
	325	425
	208	250
	137	200
	162	225
	360	447
	382	465

3049
3050

No 83 G 90.72
10 Cerium
Nonpyrophoric 5% HgO –

3051
3052

No 7 Dry 80 Fe 20 BaO
Nonpyrophoric 5% HgO –

1	315	330
	340	425
	430	562
	550	362
	512	268
	375	312
	465	827
	275	545
	95	95
	97	95
	100	95
	100	118
	87	93
	125	137
	160	165
	180	185

5 g

3053
3054 No 83 Dr 9 –
90 Fe
10 Cerium
Nonpyro
No HgO –

5 g

3055 64 Dr 9 80 Fe
3056 15 Cu
Sulphate 5 Molybdenum
5% HgO –

1	1075	995
	1240	1220
	1355	1275
	1125	1100
	962	1075
	1037	1150
	1452	1327
	1417	1295
	375	375
	65	75
	60	57
	61	62
	67	56
	100	81
	100	95
	112	112

Unusual

3) 1452
484 watt for gram

5 gram

3057 69 Dry 60 Fe
3058 40 Cd
Selfheated 5% HgO —

Very high Efficy. chg V. 165 -
61% watt efficy 80% ampere
given 1200° to V. Watt to very

5 g

3059 NO 70 Dry 80 Fe
3060 20 Bad
Nonpyro no HgO —

1	1190	1285
	1135	1290
	1335	1390
	982	887
	1100	1037
	868	731
	1400	1425
	1375	1400
	1245	1250
	620	625
	418	456
	541	562
	625	637
	967	970
	1152	1150
	1120	1115

3061 5 gram cakes
3062

Take some reg. Iron mix use water put 3 or 4 drops water in couple of of mix & work till gets damp enough to stick together when pressed in fingers
Then make Cakes of it 1/8 thick about with 900 atms & lay on hot plates for 1/2 hr.
Then crush like green nickel & sieve thro 20

Works OK - 1375 / 1400
but often many runs gets about 1250.

3063
3064 No 88 Dr G- 907g
non pyro 5% H2O 1086

Theo pocket swelled terribly & cracked, strings

Wasnt made right & quer acid nit

1505	1400
950	885
662	562
706	612
712	625
960	895
1030	727
992	900
1155	1345
600	630
375	481
468	575
537	650
582	910
1015	1062
1027	1052

up

3065 88 Dry 90 Fe
3066 10 Sb
Seefhontid 5% H_2O —

3067 No 88 Dry - 90 Fe
3068 10 Sb
Non pyro No H_2O —

1	665	830
	255	360
	125	168
	165	206
	162	218
	350	425
	422	487
	425	500
	1120	1010
	320	265
	125	81
	162	106
	175	112
	325	245
	400	320
	410	340

Uranium doubtfully seems good for iron

3069 N071 Dry
3070 8072
20 Uranium
Non pyro no H_2O —

3071 73 Dry 8072
3072 20 SrO
Non pyro no H_2O

1	740	735
	425	435
	234	225
	268	262
	231	231
	252	255
	295	295
	255	255
	885	960
	455	460
	143	143
	200	187
	200	187
	390	360
	457	425
	492	450

3073 No 71 Dr G
3074 80 Fe
20 urea
Selfheated 5% Hgo

3075 No 71 Dr G
3076 80 Fe
20 urea
non Pyrophoric 5% Hgo

550	546
280	295
143	143
131	137
112	112
160	165
190	180
200	190
1060	1015
310	295
93	81
112	118
125	118
260	265
340	360
390	395

3077 No 73 Di G

3078 80 Fe
20 Sn
selfheated 5% HgO

3079 No 73 Di G.

3080 80 Fe
20 Sn
Non Pyrophoric 5% HgO

NG Nolting

Nolting

3081 — 5 grms
Precip. Tungstate Iron
Edsommindee

3082 — Precipt'd Tungstate 7/2
run thro H. 1/2 hour — Bright
yellow — No Hg —
Took 10,326. grms

600	620
880	960
475	400
400	250
387	250
787	600
992	720
1670	775

gr. up

360	350
382	365
343	343
375	362
412	375
655	600
935	795

3083 57
3084 No 2993 –
Nonpyro ferrous sodium sulfate
250 atmosphere pressure Corrington –

Heavy pressure Kills & only pur 787 to V
after reversal - improved to 1420
1232

3085 Dry 72 80 F_2
3086 Non pyrophoric 20 CaO
Na_2SiO_3

Notice several places - after reversal great improvement
Why?

1	240	240
	330	340
	343	356
	387	425
	431	467
	432	815
	1095	1337 — 5 gm of
	250	342
	382	475
	475	475
	315	250
	212	187
	220	220
	180	195

Cerium Mg

3087 D+G 82 — 80% Ce
3088 20 CeO
Non pyrophoric 5% H_2O

3089 80% Ce
3090 D+G 82 — 20 Cerium
Non pyrophoric 5% H_2O

342	350
500	540
431	393
456	400
467	450
967	990
1312	1317
525	535
697	690
468	450
283	287
212	231
280	285
195	195

pump up

Remarkable that its so good with CaO, BaO + SrO

Cerium bad

3091 72 D.G. 80 Fe
3092 20 CaO
Selfheated 5%, HgO

3093 D.G. 82 80 Fe
3094 20 Cerium
Selfheated — 5%, HgO

1	255	325
	337	420
	406	437
	375	337
	218	225
	225	280
	187	180
	942	917
	442	437
	337	306
	406	375
	437	400
	632	595
	680	640

Some mistake in this
no wrong or unprofitable
wrong in three each charge
— Ab 72 —

3095 82 Dr. G —
3096 Non pyro —
No H_2O —

80 Fe
20 CaO

~~[illegible]~~

3097 74. Dr G 80 Fe
3098 15 Cu
5 W.

Non Pyrophoric.
no H_2O

957	817
537	472
312	243
375	300
400	306
687	585
410	592
650	657
997	1007
850	718
875	750
993	862
1330	1285
1335	1267

91 - 1 up

3099 74 Dr G.
3100 non Pyro 5% Hgo 80 Fe
15 Cu
5 W

3101 74 Dr G.
3102 silfhiated 5% Hgo 80 Fe
15 Cu
5 W

1	1157	1115
	500	477
	250	255
	300	250
	325	262
	500	465
	585	530
	1140	1140
	490	765
	487	487
	500	500
	531	531
	730	735
	820	820
	1145	1157
	435	450
	250	250
	287	287
	293	293
	485	475
	550	517

Plates run together even

bills

3103 79 Di-G. 80 Fe
3104 non Pyro 20 Cu

3105 79 Di-G 80 Fe
3106 replicated 5% Hgo 20 Cu

3107 79 Di-G. 80 Fe
3108 non Pyro no Hgo 20 Cu

1	7127	1147	7	517	560			
2	550	545	8	510	495			
3	375	550						
4	362	343						
5	340	350	7					
6	530	514	8					
1	1085	980	7	1140	1250			
2	787	900	8	1125	1200			
3	415	600						
4	443	650						
5	500	712						
6	930	1092						
1	1025	1162	7	626	557			
2	500	910	8	440	440			
3	562	687						
4	500	606						
5	375	500						
6	635	630						
1	1095	1025	7	532	530			
2	590	555	8	495	492			
3	456	443						
4	475	481						
5	437	437						
6	570	570						
1	1240	1245	7	1000	900			
2	1095	1117	8	855	780			
3	615	737						
4	715	787						
5	700	650						
6	1080	852						

3109
3110 Ferrous Potassium Sulphate, 5 g
Non pyro - 14% H_2O - mg

3111
3112 Ferric Ammonium Sulphate, 5 gr
14% H_2O - Contains of mg
non or self heat -

3113
3114 Ferric Potassium Sulphate
Self heated
14% H_2O - mg

3115
3116 Ferric Potassium Sulphate, mg
Self heated 14% H_2O -

3117
3118 Ferric Potassium Sulphate
Non pyrophoric mg
14% H_2O -

3119 — One iron from old No 2 which has run 1167 times, hot, this iron put up with 2 nickel flat test pockets —

3120 Dupe of 3119 —

When neutralized Fe goes bad

1	1345	1400				
	1195	1227				
	725	700				
	625	675				

No Current

1	127	132				
	210	210				
	100	106				
	131	143				

3121
3122 Ferric Potassium Sulphate
Non pyro No mercury
Contains some Sulphide —

3123 DrG No 80 — 80 Fe
3124 20 Manganese
5% Hg
Non pyrophoric

3125 DrG No 8 Selfheated
3126 80 Fe
20 Manganese
5% HgO —

3127 DrG — 76 — non pyrophoric
3128 80 Fe
15 Cu
5 Nickel —
5% HgO
Nonpyrophoric —

	140	135
	260	260
	193	197
	237	250
	20	22
	15	0
	0	0
1	457	462
2	600	600
3	400	400
	1040	976
	595	565
	568	312
1	1127	1100
2	580	690
3	343	425

3129
3130 No 76 G - Non pyro - 80 Fe
15 Cu
5 nickel.
No mercury

3131 Non pyrophoric 80 Fe
3132 20 manganese
No Mercury

3133 Dr G 76 Selfheated 80 Fe
3134 15 Cu
5 Ni
5% HgO —

3135 Ferrous Pot Sulphate. Non pyro
3136 No Hg — Contain some sulfide —

3137 Ferrous Potass Sulphate.
3138 Non pyro - No Hg -
This seems a dup of 3135
perhaps a mistake —
Either 3135 or this pGq got Hgo

Nothing

Nothing

3139
3140 Blue Molybdenum Oxide — 5 gr — Dry

3141
3142 Blue oxide of Tungsten Reduction Tungsten & by H. Dry
Weight used — 5 grms
It is very finely divided soils fingers worse than Fe_2O_3 or Lamp Black.

3143-44 - 93.4% amp effcy
1470 long chg 1400
Short chg — to highest effcy
yet — it should low a look
6 or 8 runs 3140 & 1150 to bring
it up —

3143-4		3145-6
520	490	492
750	675	660
876	937	900
965	1021	1081
1125	1150	1594
1475	1580	1575
1575	1610	1630
1620	1675	

Note B

Also note that I only selected the one of the highest Corrugate production — but made 100 alum runs the point — highest for was produced

3143
3144 - Use 2993 — 5 gm. Made
Ferrous Sodium Sulphate slightly brown grade

Smooth press 100 —
Corrugate 25 alums

3145 Use 2993 5 gm. Made
3146
Smooth press 100
Corrugate 50 alums

3147 Use 2993
3148
Smooth press 100 Not enough
Corrugate 75 alums

3149 Use 2993
3150 Smooth press 100
Corrugate 100

3151 Use 2993
3152 Smooth press 100
Corrugate 125 alums

3153

1067	
887	
681	
600	
473	
940	
1135	

3155 — 6

477	580
656	577
743	620
856	662
1220	1119
1365	1275

3157 — 8

1525	1472
1425	1160
1450	1272
1431	1250
1450	1168
1550	1540
1595	1500

3159 — 60

490	497
2275	2290
875	942
625	604
762	727
1290	1273
1400	1413

3153 Ra 849
3154 Ferrous sodium Sulfate Nonpyro
14% HgO —
only enough for one pocket

3155 Dr G 76 — 80 Fe 15 Cu 5 Ni
3156 Selfheater 5% HgO -

3157 Dr G 100 —
3158 Selfheater 95% Fe 5% Tungsten
5% HgO —

3159 Dr G 106 95 Fe 5 Tungsten
3160 Nonpyro NoHg

3161 — 2	
740	740
707	670
750	720
750	667
550	570
990	890
1070	915
3163	— 4
760	760
—	707
500	612
508	718
500	750
1050	1200
1310	1330
3165	— 6
1035	990
1130	1065
997	1000
997	997
1037	975
1500	1440
1470	1353
3167	— 8
210	195
407	395
487	465
612	570
500	475
390	375
400	400
3169	— 70
520	569
562	592
460	462
500	497
456	450
580	710
600	680

3161 DrG 104 85/Fz 15/Tungstan
3162 Nonpyro 5/HgO

3163 DrG 106 95 Fz 5 Tungstan.
3164 Self-H - 5/HgO

3165 DrG 95 70 Fz 30 Tungstan
3166 Self-H. 5/HgO

3167 DrG 104 85 Fz 15 Tungstan
3168 Self-H - 5/HgO

3169 DrG 104 85 Fz 15 Tungstan
3170 Nonpyro NoHgO

3171 — 2	
582	552
910	840
406	387
370	362
370	370
890	925
1065	1060

3173 — 4	
700	702
712	705
500	488
493	493
500	500
980	1000
1090	1135

3175 — 6	
1100	967
870	750
625	472
593	462
625	462
980	900
1140	940

3177 — 8	
1182	1200
1110	1115
987	1100
1050	1175
1000	1075
1515	1520
1495	1490

3179 — 80	
1650	1635
1580	1645
1250	1625
1450	1515
1212	1327
1495	1500
1540	1525
1570	1500

3181 — 2	
1540	1540
1550	1550
1106	837
1261	1000
1000	750
1560	1385
1450	1485
1515	1510

3171 Drl 95 70 72 30 Tungsten
3172 Non pyro 5% H_2O

3173 Drl 95 70 72 30 Tungsten
3174 Non pyro No H_2O

3175 Ra 845 Ferrous Sulphate Sulphate
3176 Non pyro 14% H_2O

3177 Dr G 106 95.72 5 Tungsten
3178 Non pyro 5% H_2O

3179 Dup of 2940 — Drl — 80 72 20 Su 10 Bi
3180 5% H_2O
Dont dup — 2940 went to 2650,

3181 Dup of 2936 — ditto —
3182
This didnt Dup well

3183–4	
295	240
305	267
300	312
462	337
275	325
670	625
585	540
625	570

3185–6	
345	335
282	282
275	325
362	500
337	375
700	745
665	690
650	700

3187–8	
575	550
700	627
575	575
500	581
400	275
785	600
670	530
665	515

3189–90	
900	905
1065	1090
750	768
712	700
718	700
1240	1245
1270	1265
1295	1280

3191–2	
945	947
950	1000
862	962
606	662
525	525
1000	1005
990	1080
1110	1145

3193–4	
815	845
940	940
600	575
625	587
675	615
1220	1235
1225	1227
1250	1250

3183 Drl 103 Non pyro 5 9 80 Fe 20 Tungsten
3184 5% HgO

3185 Drl 103 Non pyro 80 Fe 20 Tungsten
3186 no mercury

3187 Drl 103 Self Heated 80 Fe 20 Tungsten
3188 5% HgO -

3189 Drl 102 Nonpyrophoric 75 Fe 25 Tungsten
3190 No Hg

3191 Drl 102 Self heated 75 Fe 25 Tungsten
3192 5% HgO -

3193 Drl 102 Non pyro 75 Fe 25 Tungsten
3194 5% HgO -

3195–6	
490	490
780	846
700	787
893	1037
990	1187
1485	1590
3197–8	
300	290
300	290
325	320
468	462
612	637
1045	1100
3199–3200	
1000	990
1060	1090
856	900
937	1000
987	1075
1395	1385
3201–2	
597	535
430	312
150	75
162	62
250	75
390	110
3203–4	
597	662
600	660
312	375
412	475
493	600
815	900

3195 Dr 9 97 80 Fe 20 Tungsten
3196 5% HgO Self heated

3197 Dr 97 = 80 Fe 20 Tungsten
3198 Non pyrophoric Not Hg —

3199 Dr 9 97 80 Fe 20 Tungsten
3200 5% HgO Non pyro —

3201 Dr 9 101 70 Fe 30 Tungsten
3202 5% HgO Self heated

3203 Dr 9 101 70 Fe 30 Tungsten
3204 5% HgO Non pyro

3205	6
495	560
515	540
337	350
450	462
500	500
845	900

3207	8
615	570
1075	1060
712	856
712	937
750	1000
1110	1412

3209	10
1010	1020
1100	1150
743	725
737	875
750	962
1195	1300

3211	12
230	250
170	180
212	200
325	350
462	437
552	540

3213	14
1125	1115
1270	1266
1162	1250
1250	1325
1312	1375
1620	1570

3205 Dr 9 101 -
3206 Nonpyro ~~#~~ NoHgO — 80 finishing 70 7+ 20 Temper pkg 30 minutes — [illegible] pkg

3207 Ra 862
3208 14% HgO —

3209 Ra 863
3210 14% Hg —

3211 Ra 864
3212 5% HgO —

3213 Ra 868 —
3214 5% HgO

3215–16	
870	945
1025	1100
800	875
862	937
962	1000
1300	1372
3217–18	
1310	1300
975	915
737	712
812	812
787	875
1195	1197
3219–20	
565	545
1215	1150
662	674
837	800
950	950
1245	1275
3221–2	
1100	990
1285	1155
1062	937
1081	993
1250	1125
1520	1415

3223–4	
1050	1035
1065	1050
800	750
750	750
837	837
1155	1180
3225–26	
885	900
990	960
350	312
312	300
350	350
775	755

3215 Orig 98 85 Fe 15 Tungsten
3216 Self Heated 5% HgO

3217 Orig 98 85 Fe 15 Tungsten
3218 Non pyro 5% HgO

3219 Orig 105 90 Fe 10 Tungsten
3220 Non pyro 5% HgO

3221 Orig 105 90% Fe 10 Tungsten
3222 Self Heated

3223 Orig 136 Self heated 5% HgO
3224 Fe 95 Wo Bronze (yellow) 5%

3225 Orig 136 Non pyro 5% HgO
3226 Fe 95 Wo Bronze (yellow) 5%

3227-28	
945	970
200	425
75	81
75	81
100	100
190	155
3229-30	
900	980
700	730
462	500
431	456
500	500
825	840
3231-2	
1115	1110
925	915
687	625
625	587
687	625
1026	990
3233-4	
1075	1080
1000	1000
712	725
625	593
725	700
1182	1215
3235-6	
1465	1450
1295	1290
875	925
750	875
931	993
1425	1425

3237-8	
940	937
940	920
731	687
625	625
700	687
1115	1100

√ + Sb

3227 Drl 94 80% 15 Sb
3228 Non pyro. 5% H_2O.

3229 Drl 78 Self H - 80% 15 Cu 5 Pb
3230 5% H_2O

3231 Ferric Sodium Oxalate.
3232 Non pyro 14% H_2O -

3233 Drl 126 Self H.
3234 5% H_2O Fe 75% Wo Bronze (red) 25%

3235 Drl 75 - Self H - 80% 15 Cu 5.56.
3236 5% H_2O

3237 Drl 129 Self H.
3238 5% H_2O.

Fe 90% Wo Bronze (red) 10%

3239-40

370	270
95	100
37	87
50	37
87	81
137	152

3241-42

597	580
640	630
325	350
312	375
350	350
670	687

3243-44

1050	1040
900	900
1462	625
593	593
693	693
1682	1065

3245-6

1075	1025
1075	1000
825	750
750	715
850	787
1262	1240

3247-8

1075	1075
900	900
675	650
992	990

3249-50

1170	1250
1075	1290
775	937
1215	1410

3239 Dr 93 Nonpyro -
3240 5% H_2O 80 Fe 10 Bi 10 Sb.

3241 Dr G 78 - Non pyro. 80 Fe 15 Cu 5 Pb
3242 5% H_2O.

3243 Dr G 129 - Non pyro
3244 5% H_2O. Fe 90% Wo Oxyge (red) 10%

3245 Dr 128 Self H.
3246 5% H_2O - Fe 85% Wo Oxyge (red) 15%

3247 Ferric Sodium Oxalate.
3248 Self Heated, 14% H_2O

3249 Dr 1 75 80 Fe 15 Cu +5 Sb
3250. Nonpyro - 5% H_2O

3251–2	
962	985
780	800
500	500
987	975
3253–4	
225	175
0	0
3255–6	
100	182
25	21
0	0
3257–8	
1145	1112
215	190
81	75
265	250
3259–60	
1400	1282
362	320
175	162
430	312
3261–2	
1000	957
700	692
600	550
975	975
3263–4	
990	960
580	440
462	375
757	700

Antimony doubt
seem prominent

3251 Dr 9 85 70 Fe
3252 5% H_2O Nonpyro 30 Sb.
7 g

3253 5 grams 85 Fe
3254 Dr 9 87 Selfft – 5% H_2O 15 Sb –

3255 5 grams 85 Fe
3256 Dr 9 87 – Nonpyro 5% H_2O – 15 Sb –

3257 5 grams 80 Fe
3258 Dr 9 93 Selfft. 5% H_2O 10 Sb ✓
6 g. 10 Bi

3259 Dr 9 94 – Selfft. 5% H_2O 80 Fe
3260 15 Sb –
6 grams 5 Bi ✓

3261 5 grams S
3262 Dr 9 125 Nonpyro 5% H_2O
Fe 70 % Wo Bronze (red) 30 %

3263 5 grams S
3264 Dr 9 126 – Nonpyro 5% H_2O
Fe 75 % Wo Bronze (red) 25 %

3265-6	
1000	1020
725	722
562	585
955	960
3267-8	
900	880
885	982
568	465
975	892
3269-70	
925	1050
785	1055
556	925
995	1300
3271-2	
1052	1052
980	955
715	697
1055	1100
3273-4	
725	580
698	665
562	525
815	780
3275-6	
995	1052
982	997
725	750
1126	1155
3277-8	
1132	1145
917	890
925	718
1125	1100

5 gms

3265 Dr 9 128 Nonpyro ?
3266 5% HgO - Fe 85% Wo Bronze (red) 15%

3267 5
3268 Dr 9 130 Nonpyro 5% HgO ?
Fe 95% Wo Bronze (red) 5%

3269 5
3270 Dr 9 134 Nonpyro 5% HgO ?
Fe 85% Wo Bronze (yellow) 15%

3271 5
3272 Dr 9 142 Nonpyro 5% HgO ?
Fe 95% Wo oxide (blue) 5%

3273 Dr 9 154 Nonpyro 5% HgO ?
5,810 g Fe 95% Red Wo Bronze 5%

3275 Dr 9 99 90% 10 Jumpter
3276 Nonpyro 5% HgO -

3277 Dr 9 127
3278 Nonpyro 5% HgO
Fe 80% Wo Bronze (red) 20%

3279–80	
1365	1300
855	890
700	687
1070	1100
3281–2	
1050	1090
1015	997
667	673
1200	1155
3283–4	
1237	1232
980	980
50	670
20	1067
3285–6	
780	777
960	775
675	475
1067	900
3287–8	
940	900
890	822
650	582
995	935
3289–90	
900	1152
792	985
618	775
1032	1177
3291–92	
1365	1500
50	1167
781	825
1152	1270

3279
3280 Drg 155 non pyro
5% HgO

Extra sample in 2 oz bottle

3281
3282 Drg 146 non pyro 5% HgO - 6. grams
Fe 85% Wo oxide (blue) 15%

3283
3284 Drg 77 non pyro 5% HgO. 5.5 gr
Fe 80% Cu 15% Cd. 5%

3285
3286 Drg 137 non pyro 5% HgO. 5.5 grams
Fe 70% Wo oxide (blue) 30%

3287
3288 Drg 134 non pyro 5% HgO.
Fe 85% Wo Bronze (yellow) 15%

3289
3290 Drg 131 non pyro 5% HgO
Fe 70% Wo Bronze (yellow) 30%

3291
3292 Drg 77 Selfheat 80% Fe 15 Cu
5% HgO - 5.5 g
Fe 80% Cu 15% Cd. 5%

3293 Drg 135 non-pyro 5% H_2O_2 90% Fe 10% Wo bronze
3294 Fe 90% Wo Bronze (yellow) 10%

3295 Drg 86. non-pyro 5% H_2O 80% Fe 20% Sb
3296 Fe 80% Sbi 20% as oxalates

3297 Drg 90 non-pyro 5% H_2O 80% Fe 20% Titanium
3298 Fe 80% Titanium 20%

3299 Drg 133 non-pyro 5% H_2O_2
3300 Fe 80% Wo Bronze (yellow) 20%

3301 Drg 90 self-heated 80% Fe 20% Titanium
3302 5% H_2O Fe 80% Titanium 20%

3303 Drg 151 non-pyro
3304 5% H_2O — 6. grm
Fe 80% Wo Bronze (red) 20%

3305 Drg 145 non-pyro 5% H_2O —
3306 Fe 80% Wo oxide (blue) 20%

3297–8

275	280
37	30
0	0
25	27

3301–2

410	425
25	37
0	0
20	25

Note bad Titanium

Titan Bad

3317–18

475	450
400	300
156	125
400	300

3307 Dr 9 139 non-pyro 5% H_2O -
3308 Fe 80% Mo oxide (blue) 20%

3309 86-(B) 9 non-pyro 5% H_2O. 6.5.9
3310 Fe 80% Sb-20% made as hydrates

3311 Dr 9 141 non-pyro 5% H_2O.
3312 Fe 90% Mo oxide (blue) 10%

3313 Dr 9. 138 non-pyro 5% H_2O
3314 Fe 75% Mo oxide (blue) 25%

3315 Dr 9 132 non-pyro 5% H_2O.
3316 Fe 75% Mo Bronze (yellow) 25%

3317 86 (C) 9 - non-pyro 5% H_2O.
3318 Fe 80% Sb. 20% made as nitrates

3319 Dr 9 133. Self heated
3320 5% H_2O Fe 80% Mo Bronze (yellow) 20%

3325		6
100		100
97		100
62		75
100		117

note bad effects Cu + antimony Contin

3321 Dr 9 152 5% H_2O 5.5 g
3322 Non pyrophoric
Fe 85% Wo Bronze (red) 15%

3323 Dr 9 - 150 - Non pyro 5% H_2O 6.5 g
3324 Fe 75% Wo. Bronze (red) 25%

3325 Dr 9 92 Non pyro. 5% H_2O 6 g
3326 Fe 80% Sb 5% Cu 5%

3327 Dr 9 145 Self Heated 5% H_2O
3328 Fe 80% Wo oxide 20%
(blue)

3329 Dr 9 154 Self Heated 5% H_2O
3330 Fe 95% Wo. Bronze (red) 5%

3331 Dr 9 143 Non pyro
3332 5% H_2O Fe 70% Wo oxide
(blue) 30%

3333 Dr 9 138 Self Heated.
3334 5% H_2O - Fe 75% Wo oxide
(blue) 25%

3339-40

740	617
800	670
612	500
770	690

Note poor Sb Cu Coulon

3341-2

1170	1145
920	875
931	815
1300	1230

3335
3336 Dr 9 99 Self heat 5% H_2O

Fe 90% Tungsten 10%

3337
3338 Dr 9 153 Non pyro 5% H_2O — 6g

Fe 90% Wo. Orange (red) 10%

3339
3340 Dr 9 91 — Non pyro. 5% H_2O — 8g

Fe 80% Sb. 10% Cu 10%

3341
3342 Dr 9 87 non pyro 5% H_2O

Fe 85% Sb. 15%

3343
3344 Dr 9 139 — Self Heated 5% H_2O —

Fe 80% Wo. oxide (blue) 20%

3345
3346 Dr 9 125 Self Heated 5% H_2O —

Fe 70% Wo Orange (red) 30%.

3347
3348 Dr 9 144 5% H_2O

Fe 75% Wo oxide (blue) 25%

3349 Dr 9 148 Nonpyro
3350 5% HgO — Fe 95% Wo. Oxide (blue) 5%

3351 Dr 9 89 nonpyro 95 Fe 5 Sb —
3352 5% HgO. bg
Fe 95% Sb. 5%

3353 Dr 9 140 nonpyro —
3354 5% HgO — Fe 85% Wo. Oxide (blue) 15%

3355 Dr 9 146 Self Heated
3356 5% HgO — Fe 85% Wo oxide (blue) 15%

3357 Dr 9 84 Nonpyro 60 Fe 40 Sb.
3358 5% HgO bg
Fe 60% Sb. 40%

3359 Dr 9 141. Self Heated
3360 5% HgO — Fe 90% Wo. oxide 10% (blue)

3361 Dr 9 147 Non pyro
3362 5% HgO Fe 90% Wo. oxide (blue) 10%

3363 Drl 151 Self Heated 5.5 g
3364 5% HgO
Fe 80% Wo. Bronze (red) 20%

3365 Dr 9 155 Self Heated 4 g
3366 5% HgO Extra sample see R. Atlas book

3367 Drl 86 Self heated
3368 5% HgO
Fe 80% Sbr 20%

3369 Drl 76 – Nonpyro 80% Fe 15% Cu
3370 5% HgO 5% Ni 4.g
Fe 80% Cu 15% Ni 5%

3371 Drl 149 – 5% HgO Nonpyro
3372
Fe 70% Wo Bronze (red) 30%
Series 149 – 154 incl (mounted with Ala Meteorite)

3373 Drl 86 B – Self Heated 7 g
3374 5% HgO –
Fe 80% Sb. 20%

3375 Drl 132 Self heated –
3376 5% HgO – Fe 75% Wo. Bronze (yellow) 25%

3377
3378 Dr 9 140 Self Heated
5% HgO Fe 85% Mo oxide (blue) 15%

3379
3380 Dr 9 137 5% HgO - Self Heated.
Fe 70% Mo oxide (blue) 30%

3381
3382 Dr 9 91 - Self Heated 80% 9g
5% HgO 10 Sb
10 Cu

3383
3384 C. 9. Self heated 4.g
5% HgO

3385
3386 Dr 9 157 Self heated
5% HgO Fe 85% MoBornite (red) 15%

3387
3388 Dr 9 127 Self Heated
5% HgO Fe 80% MoBornite (red)
20%

3389 Drl 147 Selfheated
3390 5% HgO Fe 90% Mo Oxide 10%

3391
3392 Drl 130 Selfheated
5% HgO Fe 95% Mo Bronze (Red) 5%

3393
3394 Drl 135 Selfheated
5% HgO Fe 90% Yellow Mo Bronze 10%

3395
3396 Drl 142 Selfheated 4 g
5% HgO Fe 95% Mo Oxide (blue) 5%

3397
3398 Drl 100 Non pyro 4 g
5% HgO Fe 95% Tungsten 5%

3399 Shoops Fe reduced made electrically
3400 5 gr 6.5

3401 Drl 149 Selfheated
3402 5% HgO Fe 70% Red Bronze 30% (Tungsten)

3403
3404 Drg 143 Self Heated
5% HgO — Fe 70% Tungsten Oxide (blue) 30%

Sieves 143 – 148 mesh. No oxide mineral
Ferrous oxalate mixture with the 10% Tungsten
roasted reduced when available

3405
3406 Drg 89 Self heated
5% HgO Fe 95% Sb. 5%

Phenomenon
Both pockets
Split 6-Dry —

3407
3408 Drg 150 Self heated
5% HgO Fe 75% Red Bronze 25% (Tungsten)

3409
3410 Drg 153 Self heated
5% HgO Fe 90% Red Bronze 10% (Tungsten)

3411
3412 Drg 144 Self heated
5% HgO Fe 75% Tungsten (blue) Oxide 25%

3413
3414 Drg 87 Self heated
5% HgO Fe 85% Sb. 15%

3415
3416 Drg 92 Self heated 6.5g
5% HgO — Fe 80% Sb. 15% Cu. 5%

		3415–16	
		170	260
3413 –	14	68	75 –
1745	1760	81	87
862	875 –	142	145 –
1162	1175 –	200	177
1627	1665		
1585	1600		

Note Cu

	1 Volt	½ V	dif	mean in μgm
	3417–18			
	1575	1665		
	1125	1275		
	1050	1281		
	1745	1875		
	1730	1765		
	3419–20			
	1055	1085		
	865	850		
	950	862		
	1485	1425		
	1600	1577		
	3421–2			
	1335	1335		
	837	837		
	956	950		
	1450	1475		
	1465	1465		
3427	150	250		
3428	180	255		
3429	165	230		
3430	172	245		

3417 Drl 100 self Heat
3418 5% HgO Fe 95% Wo 5%

3419 Drl 76 self heat
3420 5% HgO Fe 80% Cu 15% Ni 5%

3421 Drl 148 self Heated
3422 5% HgO 95% Fe 5%
(blue) Lampatic Oxide

3423 Drl 84 self heated
3424 5% HgO Fe 60% Bl. 40%

3425 Drl 131 self heated
3426 5% HgO Fe 70% yellow Wo
Bronze 30%

3427 no 1 G – non pyro 5% Hg 80 Fe 20 WO –
3428 3.5 grms –

3429 no 2 G non pyro – 80 Fe 20 WO
3430 4 grms

	Volt	V2V	def	μ=G
3431	95	130		
3432	95	130		
3433	40	50		
3434	67	75		
3435	55	62		
3436	48	50		
3437	850	1200		212
3438	855	1215		
3439	1075	1500		218
3440	1110	1485		
3441	1277	2100		258
3442	1230	2070		
3443	1027	1850		250
3444	970	1767		

3431
3432 } No 2 G self heated 5% H_2O - 80% 20 W
4 grm

3433
3434 } No 3 G non pyro 5% H_2O 80% 20 Wo
4 grm

3435
3436 } No 3 G Selfheated 5% H_2O 80% 20 Wo
4 grm

3437
3438 } No 4 G = non pyro 5% H_2O 80% 20 Wo
4 grm

3439
3440 } No 4 G self h 5% H_2O 80% 20 Wo
5 grm

3441
3442 } No 1 B - non pyro 5% H_2O 80% 20 Bi
4 grm

3443
3444 } No 1 B self H 5% H_2O 80% 20 Bi
4 grm

	Volt	V2V	di	μ9	
3445	1035	1535		400	0
3446	1000	1470			
3447	1455	2162		365	
3448	1467	2115			
3449	1390	2200		340	
3450	1335	2175			
3451	1280	2087		320	
3452	1280	2100			
3453	1665	1972		334	
3454	1680	1940			
3455	1485	2010		361	
3456	1450	1970			
3457	1405	2135		278	
3458	1375	2082			
3459	1170	1890		399	0
3460	1225	1962			
3461	1065	1875		300	
3462	1035	1865			

3445 } No 2 B non pyro 5 HgO - 80 Fe 20 Bi 2½ grm
3446

3447 } 2 B - self H - 5 HgO - 80 Fe 20 Bi 4 grm
3448

3449 } 3 B - non pyro 5 HgO - 80 Fe 20 Bi 4 grm
3450

3451 } 3 B - self H - 5 HgO 80 Fe 20 Bi 4 grm
3452

3453 } 4 B non pyro 5 HgO 80 Fe 20 Bi 5 grm
3454

3455 } 4 B - self H - 5 HgO 80 Fe 20 Bi 4 grm
3456

3457 } 5 B non pyro 5 HgO - 80 Fe 20 Bi 5 grm
3458

3459 } 6 B non pyro 5 HgO - 80 Fe 20 Bi 3 grm
3460

3461 } 6 B self H 5 HgO 80 Fe 20 Bi 3.5 grm
3462

	Volt	½ V	dif	to V 1 gram
3463	1465	2072		365
3464	1460	2080		
3465	1345	2060		336
3466	1342	2100		
3467	1340	2177		337
3468	1360	2077		
3469	1090	1575		359
3470	1065	1700		
3471	1200	1885		317
3472	1335	2075		
3473	1060	1967		270
3474	1100	1990		
3475	1330	1985		449
3476	1365	1950		
3477	685	957		
3478	625	930		

3463
3464 } 7 B non pyro 5 HgO 80 Fe 20 Bi 4 grm

3465
3466 } 8 B non pyro 5 HgO 80 Fe 20 Bi 4 grm

3467
3468 } 9 B non pyro 5 HgO – 80 Fe 20 Bi 4 grm

3469
3470 } 10 B non pyro 5% HgO 80 Fe 20 Bi 3 grm

3471
3472 } 11 B – non pyro 5% HgO 80 Fe 20 Bi 4 grm

3473
3474 } 11 B Self H. 5 HgO – 80 Fe, Bi 20 4 gr

3475
3476 } L.O. No 1 non pyro 5 HgO ferrous ammonium sulphate 3 grams –

3477
3478 } L.O. 3 non pyro 5 HgO 80 Fe Mg 20 3.5 grm

3479	677				
3480	775				
3481	1447	2067		344	
3482	1305	1865			
3483	412	625			
3484	432	675			
3485	900	1365			
3486	1055	1550			
3487	300	675			
3488	260	600			
3489	275	480			
3490	275	517			
3491	1222	1945		312	m 16% Kott. t. V 1600
3492	1270	1917			1630
3493	260	270			
3494	260	270			

3479 } 3 L.O. sulph 5 H2O 80 Fe 20 Mg 4 grms
3480

3481 } 4 L.O. nom pyro 5 H2O - 80 Fe 20 Zn 4 gr
3482

3483 } 8 L.O - nom pyro 5 H2O. Fe acetate 5 g -
3484

3485 } 9 L.O. nom pyro 5 H2O - Ferrous Carbonat. 5 gr
3486

3487 } 10 L.O nom pyro 5 H2O - ferric Chl 5 - nit 5 grms - 4 grms
3488

3489 } 10 L.O sulphat 5 H2O - Ferric 5 Chl 4 g
3490

3491 } 14 L.O - nom pyro 5 H2O 80 Fe 20 Cu 4 g
3492

3493 } No 1 G sulph 5 H2O 80 Fe 20 Wo 4 g
3494

			per 7 hr	
3495	1087	1530	246	
3496	1200	1547		
3497	1450	2057	347	in 16% NaOH, 1630 1570 — 4 liters Ni
3498	1330	1866		
3499	300	325		
3500	300	320		
3501	1180	1730	285	
3502	1100	1617		
3503	1400	1800	277	in 16% NaOH, 1730 1740 — 4 liters
3504	1372	2010		
3505	1280	1995	335	in 16% NaOH 1737 1645 — 4.5
3506	1400	1975		
3507	1100	1910	281	
3508	1200	1995		
3509	1282	1925	314	16% NaOH 1690 1392 — 4 liters Ni
3510	1235	1925		

3495, 3496 } 20 Ni Selft H 5 H_2O – Ferrous Ammonium Sulfate 4 grams

3497, 3498 } 4 Co – Selft H – 5 H_2O 80 Fe 20 Fer 4 gr

3499, 3500 } 8 Co Selft H 5 H_2O – Ferric Acetate 4 grams

3501, 3502 } 9 Co – Selft H – 5 H_2O – Ferrous Carbonate 4 grams

3503, 3504 } 14 Co – Selft H – 5 H_2O – 80 Fe 20 Cu 5 grams

3505, 3506 } 5 B – Selft H 5 H_2O – 80 Fe 20 Bi 4 grams

3507, 3508 } 8 B Selft H 5 H_2O 80 Fe 20 Bi 4 grams

3509, 3510 } 7 B – Selft H 5 H_2O 80 Fe 20 Bi 4 g

			per gram Fe	
3511	1342	1917	335	16% water free basis
3512	1340	1910		1690 -
				1700 -
3513	1000	1660		
3514	1000	1690	250	
3515	290	1090		
3516	290	1065		
3517	962	1420		
3518	1030	1487		
3519	740	987		
3520	525	761		
3521	985	1455		
3522	1000	1470		
3523	680	1170		
3524	630	1037		
3525	740	1070		
3526	695	1037		

3511 } 9 B - Self H. 5 Hgo - 80 Fe 20 Bi 4 gr
3512

3513 } 10 B - Self H. 5 Hgo - 80 Fe 20 Bi 4 grm
3514

3515 } 85 G Self H 5 Hgo 70 Fe 30 Co 5 grm
3516

3517 Drg 5. Non pyro 5% Hgo Fe 80 Wo 20
3518 4 grm

3519 Drg 5 Self H - 5% Hgo - Fe 80 Wo 20
3520 4 grm

3521 Drg 6 non pyro 5% Hgo 80 Fe Wo 20
3522 + phosphorous
4 grm

3523 Drg 6 Self H treated 5% Hgo 80 Fe 20 Wo + Phosphorous
3524 4 grm

3525 Drg 7 - Non pyro 5 Hgo - 80 Fe 20 Wo +
3526 phosphorous
3.5 grm

			kg gmw Fe
3527	630	917	
3528	685	1000	
3529	5	7	
3530	5	7	
3531	5	7	
3532	5	7	
3533	1500	2145	371
3534	1470	2190	
3535	1130	1930	390
3536	1192	1970	
3537	1350	1985	350
3538	1452	2110	
3539	1530	2030	349
3540	1267	2045	
3541	500	870	
3542	500	855	
3543	685	970	
3544	655	855	

3527 Drg 7 selfH - 5Hgo - 80 Fe 20 Wor phosphorous
3528 3.5 grm

3529 DrG 81 nonpyro 5Hgo - Fe - - - -
3530 4 grm

3531 Drg 81 selfH 5Hgo - Fe - - -
3532 4 grm

3533 B - 12 - nonpyro 5Hgo 80 Fe 20 Bi
3534 4 grm

3535 B 12 selfH 5Hgo 80 Fe 20 Bi
3536 4 grm

3537 B 13 nonpyro 5Hgo - Fe 80 Bi 20
3538 4 grm

3539 B 13 Selfheated 5Hgo - Fe 80 Bi 20
3540 4 grm

3541 B 14 - nonpyro - 5Hgo Fe 80 Bi 20
3542 4 grm

3543 B 14 selfH 5Hgo Fe 80 Bi 20
3544 5 grm

			Bi grain 7z
3545	1545	2025	289
3546	1350	2015	
3547	1600	2130	314
3548	1547	2060	
3549	575	1095	
3550	500	1005	
3551	505	960	
3552	500	840	
3553	1165	1740	225
3554	1087	1650	
3555	1167	1950	260
3556	1175	1915	
3557	1300	2025	260
3558	1295	1900	
3559	1485	1920	281
3560	1325	2040	

3545 B 15 Nonpyro 5Hgo - 7z 80 Bi 20
3546 5 grms.

3547 B 15 Selfbrazed 5Hgo 7z 80 Bi 20
3548 5 grms

3549 B 16 Nonpyro 5Hgo 7z 80 Bi 20
3550 5.5 grms

3551 B 16 Selfb - 5Hgo 7z 80 Bi 20
3552 5 grms

3553 B 17 Nonpyro 5Hgo - 80 7z 20 Bi 5 grms
3554

3555 B 17 Selfbrazed 5Hgo 80 7z 20 Bi
3556 4.5 grms

3557 B 18 Nonpyro 5Hgo - 80 7z 20 Bi
3558 5 grms

3559 B 19 Nonpyro 5Hgo 80 7z 20 Bi
3560 5 grms

			per gram
3561	920	1507	
3562	917	1457	
3563	1185	1860	
3564	1130	1802	
3565	970	1570	
3566	905	1750	
3567	860	1420	
3568	900	1500	
3569	730	1240	
3570	750	1250	
3571	1445	1850	288
3572	1440	1900	
3573	1540	1930	306
3574	1540	1925	
3575	800	1250	
3576	1025	1602	
3577	1130	1715	279
3578	1250	1900	

3561 B 19 Selfft 5Hgo 80 Fe 20 Bi
3562 5 grms

3563 B 20 Nonpyro 5Hgo 80 Fe 20 Bi
3564 5 grms

3565 B 20 Selfft 5Hgo 80 Fe 20 Bi
3566 5 grms

3567 B 21 Nonpyro 5Hgo 80 Fe 20 Bi
3568 5 grms

3569 B 21 Selfft 5Hgo 80 Fe 20 Bi
3570 5 grms

3571 B 22 Nonpyro 5Hgo 80 Fe 20 Bi
3572 5 grms

3573 B 22 Selfft 5Hgo 80 Fe 20 Bi
3574 5 grms

3575 W No 1 Non pyro 5Hgo Fe stannate,
3576 5 grms

3577 W No 1 Selfft ~~zalad~~ 5Hgo Fe stannate
3578 5 grms

			Reagent
3579	855	1235	
3580	900	1300	
3581	1045	1250	
3582	1050	1260	
3583	875	1470	
3584	915	1400	
3585	805	1300	
3586	645	975	
3587	985	1510	
3588	775	1200	
3589	1000	1500	
3590	1015	1510	
3591	1475	2050	40
3592	1446	2020	
3593	1265	1900	360
3594	1260	1925	
3595	1500	2060	300
3596	1500	1940	

3579 W 2 non pyro 5Hgo 80 Fe Sn 20
3580 4 grms

3581 W 2 Selfft 5Hgo – 80 Fe Sn 20
3582 5 grms

3583 W 3 non pyro 5Hgo 80 Fe 20 Sn
3584 5 gr

3585 W 3 Selfft 5Hgo 80 Fe 20 Sn
3586 5 gr

3587 W 4 non pyro 5Hgo 80 Fe 20 Sn
3588 5 gr

3589 W 4 Selfft Scaled 5Hgo 80 Fe 20 Sn
3590 5 gr

3591 W 6 - non pyro 5Hgo 80 Fe 20 Copper
3592 3.5 g

3593 W 6 Selfft 5Hgo 80 Fe 20 Cu
3594 3.5 g

3595 W 7 non pyro 5Hgo – 80 Fe 20 Cu
3596 5 gr

3597	1490	1900	302
3598	1535	2065	
3599	425	695	
3600	485	645	
3601	420	640	
3602	330	435	
3603	1230	1920	
3604	1185	1865	
3605	1360		269
3606	1335		
3607	1500	2155	449
3608	1630	2195	
3609	1550	1940	387
3610	1550	1900	
3611	685	950	
3612	645	895	
3613	490	665	
3614	415	455	

3597 W 7 Sulph 5Hgo 80 Fe 20 Cu
3598 5 gr

3599 W 8 Nonpyro 5Hgo - 80 Fe Cu 20
3600 4.5 g

3601 W 8 Sulph 5Hgo 80 Fe 20 Cu
3602 5 gr.

3603 W 10 Nonpyro 5Hgo - Fe 80 Cu 20
3604 5 gr

3605 W 10 Sulph 5Hgo 80 Fe 20 Cu
3606 5 gr

3607 W 11 Nonpyro 5Hgo 80 Fe 20 Cu
3608 3.5 g

3609 W 11 Sulph 5Hgo 80 Fe 20 Cu
3610 4 gr

3611 W 12 Nonpyro 5HgO - 80 Fe 20 Cu
3612 4 gr

3613 W 12 Sulph " "
3614 4.5 gr

3615	1120	1850
3616	1215	2070
3617	1045	1280
3618	1140	1630
3619	890	1440
3620	1065	1560
3621	940	1395
3622	1055	1435
3623	440	560
3624	665	865
3625	635	675
3626	460	535
3627	1310	1865
3628	1340	1675
3629	875	970
3630	950	1075

3615 Glasier 1 nonpyro 5 Hgo 80 72 20 56
3616 5 gr

3617 Glasier 1 Seleff 5 Hgo 80 72 20 56
3618 5 gr

3619 Glasier 2 nonpyro " "
3620 5 gr

3621 Glasier 2 Seleff " " 5 gr
3622

3623 Glasier 3 nonpyro " " 5 gr
3624

3625 Glasier 3 Seleff " " 5 gr
3626

3627 Glasier 4 nonpyro " " 5 gr
3628

3629 Glasier 4 Seleff " " 4.5 gr
3630

3631	535	875	glassy
3632	600	880	
3633	345	575	
3634	315	555	
3635	930	1385	
3636	1010	1385	
3637	525	1225	
3638	530	1190	
3639	555	1100	
3640	600	1260	
3641	1325	1930	
3642	1340	2050	
3643	1440	2025	320
3644	1455	2095	
3645	1115	1200	252
3646	1140	1190	

3631 Glasses 5 nonpyro 5 H_2O 80 Fe 20 Sb 4 gr
3632

3633 Glasses 5 Sulfit – " " 4 gr
3634

3635 Glasses 6 – nonpyro " " 4 gr
3636

3637 Glass 7 nonpyro " " 4 gr
3638

3639 Glass 7 Sulfit " " 5 gr
3640

3641 Glasses 6 sulfit. 5 H_2O $Fe_2(OH)_6$ 5 gr
3642

3643 Glasses 8 nonpyro 5 H_2O. Fe 80 Sb 20 4.5 g
3644

3645 Glasses 8 Sulfit 5 H_2O 80 Fe 20 Sb 4 gr
3646

3647	1435	2045	
3648	1435	1975	
3649	590	1050	
3650	630	1090	
3651	490	900	
3652	490	800	
3653	225	480	
3654	200	425	
3655	360	700	
3656	280	495	
3657	770	1225	
3658	830	1295	
3659	1350	2000	
3660	1380	2125	2/3
3661	1300	1950	
3662	1435	2040	2/3

3647 B-18-Seqft 5Hg0 Fe80 Bi20 5 gr
3648

3649 Drl 8 nonpyro-5Hg0-Fe80Wo20 5 gr
3650

3651 Drl 8 Seqft-Hg05% 80Fe20Wo 5 gr
3652

3653 Drl 9 nonpyro-5Hg0-80Fe20Wo20 5 gr
3654

3655 Drl 9 seqft 5Hg0 " 5
3656

3657 Drl 10 nonpyro5Hg0 " 5 gr
3658

3659 Drl 10 Seqft. 5Hg0 " 5 gr
3660

3661 Drl 11 nonpyro 5Hg0 " 5 gr
3662

3663	1300	1690
3664	1335	2025
3665	865	1660
3666	885	1690
3667	590	1195
3668	590	1065
3669	980	1410
3670	930	1345

3663 Dry 11 selfft 5Hgo 80 7 20 WO. 5 qt
3664

3665 Dry 12 nonpyro 5Hgo - " 5 qt
3666

3667 Dry 12 Selfft 5Hgo " 5 qt
3668

3669 W 29 nonpyro 5Hgo 4
3670 Prussian Blue (Baker Blue) -

Note Have condition & OK to set up 2 coolers Fresh with 2 Reg ni tubes for Each iron Ra No 862 - has all been sent

Ra No 863

Ra No 868

	V	½ V	
3671	1100	1800	
3672	1105	1755	
3673	1400	2075	272
3674	1320	2050	
3675	1400	2030	267
3676	1475	2130	
3677	265	730	
3678	290	920	
3679	270	425	
3680	225	500	
3681	1170	1750	290
3682	1155	1725	
3683	1275	1770	309
3684	1195	1795	

3671 } da W 20 selfft 5Hg0 4 gr
3672 } Prussian blue (Baslin blue)

3673 B-30 nonpyro 5Hg0 5 gr
3674 80% B. 20

3675 B 30 Selfft 5Hg0 5 gr
3676 80% B. 20

3677 nonpyro 5Hg0 5 gr
3678 G 15

3679 G.15 Selfft 5Hg0 4 gr
3680

80% W 20

3681 } G 16 S nonpyro 5Hg0 4 gr
3682 }

Red 10 G
double from
Ra 16 w and
80% W 20

3683 G16 S selfft 5Hg0 4
3684

G16 S

3685	610	965
3686	590	910
3687	530	680
688	530	683
3689	600	995
90	610	965
3691	575	645
3692	515	580
3693	620	1055
3694	395	495
3695	350	430
3696	410	475
3697	1035	1525
3698	1035	1500
3699	1090	1775
3700	1325	2060

3685 } G 17 non pyro 5Hg 5 gr
3686 } 7Fe 80 Wo 20

3687 } G 17 Scoff H 5Hg0 - 5
3688 } 80 7Fe 20 Wo

3689 } G 21 - non pyro 5Hg0 - 5
3690 } 80 7Fe 20 Wo

3691 } G 21 Scoff. 5Hg0 4 gr
3692 } 80 7Fe 20 Wo

3693 } G 22 non pyro 5Hg0 5 gr
3694 } 80 7Fe 20 Wo

3695 } 22 G Scoff. 5Hg0 4 gr
3696 } 80 7Fe 20 Wo

3697 } 23 G non pyro 5Hg0. 5 gr
3698 } 80 7Fe 20 Wo

3699 } 23 G Scoff. 5Hg0 4 gr
3700 } 80 7Fe 20 Wo

3701	865	1500
3702	875	1525
3703	860	1540
3704	860	1490
3705	775	1275
3706	750	1250
3707	995	1610
3708	1000	1640
3709	1010	1710
3710	1055	1845
3711	1230	1775
3712	1300	1970
3713	605	1030
3714	905	1190
3715	690	1105
3716	840	1415

3701 } B 28 non pyro 5%Hgo 7 grm
3702 } 7680 Bi 20

3703 B 28 Self ft 5%Hgo 7 grm 80 Fe 20 Bi
3704

3705 } B 31 non pyro 5%Hgo 7 gr
3706 } 80 Fe 20 Bi

3707 B 31 Self ft, 5%Hgo 7 grm
3708 80 Fe Bi 20

3709 } B-35 non pyro 5%Hgo 5 grm
3710 } 80 Fe 20 Bi

3711 B 35 Self ft 5%Hgo-6 grms
3712 80 Fe 20 Bi

3713 } B 36 non pyro 5%Hgo. 6 grms
3714 } 80 Fe 20 Bi

3715 } B 36 Self ft 5%Hgo-6 grms
3716 } 80 Fe 20 Bi

3717	840	1320
3718	840	1315
3719	940	1515
3720	905	1465
3721	735	750
3722	115	125
3723	765	780
3724	270	280
3725	1500	2130
3726	1315	1315
3727	1530	2195
3728	1555	2035
3729	1100	1660
3730	1260	1910
3731	1260	1925
3732	1510	1840

all 5% Hg0

3717 B37 nonpyro 5 gr 80% 20 Bi
3718

3719 — B37 SHsalad 5 gr 80 Fe 20 Bi
3720

3721 } W 13 nonpyro 5 gr 80% Fe 20 Zn
3722

3723 } W 13 Scaft 5 gr "
3724

3725 } W 15 nonpyro 5 gr 80% 10 Cu
3726 10 Sn 10 Zn

3727 W 15 Scaft. 5 gr "
3728

3729 } W 34 nonpyro 4 gr 7% 80 Cu 20
3730

3731 W 34 Scaft. 5 gr "
3732

3733	1050	1670
3734	1035	1625
3735	1400	1800
3736	1300	1640
3737	1180	1800
3738	990	1360
3739	1115	1550
3740	1155	1600
3741	460	780
3742	100	130
3743	425	870
3744	420	970
3745	1545	1815
3746	1510	1895
3747	1545	2145
3748	1500	2300

3733 } W44 nonpyro 4.5 gr plain iron
3734 }

3735 W44 Sceft. 5 gr "
3736

3737 glasser 9 nonpyro 6 gr 8072 2056
3738

3739 } glasser 9 Sceft. 6 gr "
3740 }

3741 } glasser 10 Nonpyro 6 gr "
3742 }

3743 } glasser 10 Sceft. 5 gr "
3744 }

3745 } glasser 11 Nonpyro 5 gr "
3746 }

3747 } glasser 11 Sceft. 4.5 gr "
3748 }

	1V	½V
3749	1288	1855
3750	1235	1810
3751	875	1310
3752	590	930
3753	1095	1460
3754	1220	1580
3755	260	95
3756	370	270
3757	1200	1795
3758	1115	1680
3759	870	1490
3760	865	1485
3761	690	840
3762	715	890
3763	1230	1630
3764	1235	1735
3765	1175	1565
66	1170	1635

5% Hg O in all

3749 } Dr 9 41 Selfff 80% 20 Cu this is one you wanted
3750 } made over 4 grms

3751 } Dr 9 13 – Nonpyro 80% 20 Wo.
3752 } 6 grms

3753 } Dr 9 13 Selfff "
3754 } 5 grms

3755 } Dr 9 18 nonpyro "
3756 } 6 grms

3757 } Dr 9 18 Selfff "
3758 } 4.5 grms

3759 } Dr 9 21 non pyro "
3760 } 4.5 grms

3761 } Dr 9 21 Selfff "
3762 } 4.5 grms

3763 } Dr 9 24 nonpyro "
3764 } 5 grms

3765 } Dr 9 24 Selfff "
3766 } 4 grms

3767	805	1020	
3768	705	950	
3769	1035	1475	
3770	1125	1560	
3771	1425	1920	
3772	1440	1925	
3773	1190		
3774	1175		
3775	915	1175	
3776	960	1130	
3777	450	750	
3778	150	290	
3779	1340	1815	
3780	1285	1755	
3781	955	1260	5
3782	320	370	1

3767 } Drl 25 non pyro 80% Fe 20 Wo
3768 } 5 grms

3769 } Drl 25 Sclfft 5 grms "
3770 }

3771 } Drl 26 non pyro 4.5 grms "
3772 }

3773 } Drl 26 Sclfft. 4 grms "
3774 }

3775 } Drl 27 non pyro 4 grms "
3776 }

3777 } Drl 27 Sclfft 4.5 grms "
3778 }

3779 } Drl 28 non pyro 4.5 grms "
3780 }

3781 } Drl 28 Sclfft 7 grms "
3782 }

3783	995	1475
3784	1195	1765
3785	1015	1420
3786	1210	1790
3787	675	1435
3788	720	1445
3789	450	765
3790	430	805
3791	1425	1805
3792	535	1135
3793	1000	1585
3794	1390	2000
3795	445	805
3796	415	700
3797	380	700
3798	385	700

5

3783 Glaster 12 Non pyro 80 Fe 5b 20
3784 .5 grms

3785 } Glaster 12 Sceff ff "
3786 } .5 grms

3787 } Glaster 13 Non pyro "
3788 } 4 grms

3789 } Glaster 13 Sceff ff, "
3790 } 3 grms

3791 } Glaster 14 Non pyro "
3792 } 4.5 grms

3793 } Glaster 14 Sceff ff "
3794 } 4.5 grms

3795 } Glaster 15 Non pyro "
3796 } 3.5 grms

3797 } Glaster 15 Sceff ff "
3798 } 3.5 grms

3799	1400	1990
3800	1435	2050
3801	1530	1885
3802	1575	2035
3803	1385	2030
3804	1345	1990
3805	1400	1900
3806	1445	1975
3807	1125	1875
3808	1050	1730
3809	1100	1955
3810	915	1650
3811	1045	1665
3812	1090	1835
3813	750	1050
3814	780	1075

all 5% HgO —

3799 } B 24 non pyro 7.80 B. 20
3800 } 6 grms

3801 } B 24 Scelfff "
3802 } 5 grms

3803 } B 33 non pyro "
3804 } 5 grms

3805 } B 33 Scelfff "
3806 } 5 grms

3807 } B 39 Nonf "
3808 } 3.5 grms

3809 } B 39 Scelfff "
3810 } 4.5 grms

3811 } B 40 Nonf "
3812 } 4 grms

3813 } B 40 Scelfff "
3814 } 3.5 grms

3815	1230	1800
3816	1270	1755
3817	1440	1700
3818	1350	1775
3819	1300	1775
3820	1225	1700
3821	1425	1750
3822	1375	1700
3823	1600	1870
3824	1580	1800
3825	1685	2015
3826	1665	2045
3827	870	845
3828	895	835
3829	1420	1850
3830	1420	1770

3815 B43 NonP 5 grms 80Fe20 Pt

3817 B43 Scaft 5 grms "

3819 W 34 NonP- 4 grms Fe80 Cu20

3821 W 34 Scaft 4 grms "

3823 W 49 NonP 4.5 grms Cupriferous Sodium sulphide

3825 W49 Scaft 4.5 grms "

3827 Sphalerite 16 NonP 5Hg0- 4.5 Fe80 Sb20

3829 Sphalerite 16 Scaft. 5Hg0 4.5 "

3831	595	930
3832	635	955
3833	1350	1635
3834	1395	1690
3835	295	470
3836	320	485
3837	5	6
3838	10	15
3839	1300	1655
3840	1300	1690
3841	1300	1680
3842	1310	1765
3843	1000	1495
3844	985	1770
3845	1075	1855
3846	1065	1845

3831 } Phenolsulfon 17 Nonpyro 72 80 5b 20
3832 } 5 Hydro 3 grms

3833 } Phenolsulfon 17 Sulfoth. 5 Hydro "
3834 } 3 grms

3835 } Phenolsulfon 18 Nonpy 5 Hydro "
3836 } 5 gr

3837 } Phenolsulfon 18 Sulfoth "
3838 } 4 grm

3839 } Phenolsulfon 19 Nonpyro "
3840 } 5 Hydro 4 grms

3841 } Phenolsulfon 19 Sulfoth 5 Hydro "
3842 } 4.5 grms

3843 } W 28 nonp 5 Hydro Halchettes Brown
3844 } 5 gr

3845 } W 28 sulfoth 5 Hydro "
3846 } 5 gr

3847	790	1300	
3848	785	1265	
3849	790	1300	
3850	790	1300	
3851	1200	1695	
3852	1200	1675	
3853	1370	1675	
3854	1260	1700	
3855	1495	1855	
3856	1455	1785	
3857	1570	1750	Holland Effcy 6618 66 —
3858	1475	1630	
3859	365	650	
~~3860~~			
3861	295	595	

3847 } W 32 non 5 H_2O
3848 } 4.5 g

3849 W 32 Sulph "
3850 4.5 g

} Ferrous Cupric ammon chloride fusion

3851 } W 33 non 5 H_2O
3852 } 6 gr

3853 } W 33 Sulph 5 H_2O
3854 } 5 gr

} Fe_2O_3 + NH_4Cl fusion

3855 } W 41 non pyro 5 H_2O
3856 } 4.5 g

3857 } W 41 Sulf "
3858 } 4 gr

} Ferrous ammonia sulfate fusion

3859 } W 42 non p 5 H_2O
~~3860~~ } 4.5 one pocket

3861 W 42 Sulf
~~3862~~ 4.9 gr one pocket

} Ferrous Zinc Sulfate + NaCl fusion

3863	1100	1650	
3864	1145	1655	
3865	1145	1400	
3866	1060	1330	
3867	1325	1725	Holland 65.9 65.8 watt effy
3868	1390	1825	
3869	1600	1845	Holland 68.5 68.4 effy watt
3870	1425	1695	
3871	1000	1695	
3872	995	1755	
3873	1215	1880	
3874	1220	1940	
3875	1175	1685	
3876	1220	1775	
3877	1540	1835	Holland effy 67.4 62.2 watt
3878	1315	1830	

4.5 | 1600 | 3.5
1350
3250
2/2

3863 } W 43 non p → 5 H_2O. 4 grs
3864 }

3865 } W 43 Sel ft " 4.5 grs
3866 }

Ferrous Zinc Sulfate Fusion

3867 } W 48 non p 5 H_2O 4.5 g
3868 }

3869 } W. 48 Sel ft 5 H_2O 4.5 g
3870 }

Cupric Ferrous Ammon Sulfate Fusion

3871 } W 50 non 5 H_2O 8 grs
3872 }

3873 } W 50 Sel ft. " 6 grs
3874 }

Ferrous Sodium Nitrate Fusion -

3875 } W 51 non 5 H_2O 5.5 grs
3876 }

3877 } W 51 Sel ft. 5.5
3878 }

Fe 80 Cu 10 Sn 10 Zn 10 Cd 10 by parts Fusion

3879	1295	1865
3880	1190	1780
3881	1540	1890
3882	1420	1620
3883	1300	1700
3884		
3885	1390	1745
3886	1450	1895
3887	785	1300
3888	675	1120
3889	970	1600
3890	900	1575
3891	125	200
3892	750	1365
3893	40	50
3894	100	125

Holland 67.3 68.4 courtesy

Hot test 50 Runs good
before 1575 after 1625
1627 1550

4 | 1625
463

3879 } W 53 Non 5Hgo 4.5gr
3880 }

3881 } W 53 Seeff " 5 gr
3882 }

} Fe_2O_3 + NaCl + Na_2SO_4 fusion

3883 } W 54 non 5Hgo - 4.5g
3884 }

3885 } W 54 Seeff " 4 gr
3886 }

} ferrous ammonium sulfate have trouble in sensitive range

3887 } B 23 Non 5Hgo 80 Fe 20 Bi
3888 } 5 gr

3889 } B 23 Seef " 5 gr "
3890 }

3891 } B 25 Non " 4.5 gr "
3892 }

3893 } B 25 Seeff " 4.5 "
3894 }

3895	1125	1830	3895	B 27	Non Pyro	5 Hg0 4 grm	80% 20 B.1
3896	1150	1845	3896				
3897	965	1680	3897	B 29	Self	" 4 grm	"
3898	320	495	3898				"
3899	590	760	3899	B 29	Non p	4.5 g	"
3900	390	520	3900				
3901	455	725	3901	B 29	Self H	4 gr	"
3902	395	615	3902				
3903	1300	1760	3903	B 32	Non p	5 gr	"
3904	1300	1700	3904				
3905	1100	1840	3905	B 32	Self H	5 gr	"
3906	1080	1830	3906				
3907	1000	1535	3907	B 38	Non p	6 gr	"
3908	995	1520	3908				
3909	1000	1745	3909	B 38	Self H	6 gr	"
3910	960	1670	3910				
3911	1015	1855	3911	B 41	Self H	5 gr	"
3912	1080	1835	3912				

3913	895	1560	3913 } B 41 Non 5Kgo 5gr 80 7 2 20 B1
3914	900	1600	3914 }
3915	1405	1850	3915 } B 44 Non py 5Kgo 5gr "
3916	1230	1720	3916 }
3917	900	1700	3917 } B 42 Self H, 5 gr "
3918	900	1730	3918 }
3919	685	1430	3919 } B 42. Non pyro 5 gr "
3920	745	1500	3920 }
3921	1200	1860	3921 } B 44 Self H 5 gr "
3922	1325	1930	3922 }
3923	1015	1590	3923 } G 31 Non 4 gr 7 2 80 Wo 20
3924	1048	1685	3924 }
3925	875	1415	3925 } G 32 Non py 4.5 gr "
3926	820	1350	3926 }
3927	47	57	3927 } G 33 Non p 4 gr "
3928	40	50	3928 }

3929	40	50
3930	37	45
3931	720	1155
3932	975	1385
3933	1660	1340
3934	875	1125
3935	1325	1790
3936	1400	1650
3937	1430	1700
3938	1400	1660
3939	1150	1640
3940	1440	1700
3941	670	1215
3942	650	1200

3929 } G 33 self 4 gr Fe_2O_3 80 Wo 20
3930 }

3931 } G 34 non 5 gr "
3932 }

3933 } G 34 Selfth 4.5 gr "
3934 }

3935 } G 36 non p 4.5 "
3936 }

3937 } G 36 Self 5 gr "
3938 }

3939 } G 35 Non 4 gr
3940 }

3941 } W 55 non 6 gr. Fe_2O_3 + NH_4Cl
3942 } directly reduced in hydrogen then
washed in alkaline water
take out last traces chlorides
Fusion point observed in Dammer

3946	1440	1760
3947	1435	1895
3948	1235	1500
3949	1185	1520
3950	600	670
3951	505	600
3952	510	780
3953	510	610
3954	1185	1840
3955	1200	1830
3956	1360	1680
3957	800	1250
3958	1360	1760
3959	1330	1725
3960	1300	1750
3961	1295	1730

3946 } W 47 non pyro 5Hg0 7z only 4 gr
3947 }

3948 } W 47 Scaft. 4 gr
3949 }

3950 } W 56 - non pyro 7z only 5Hg0 3.5 g
3951 }

3952 W 56 Scaft. 4 gr
3953

3954 B 26 non py 5Hg0 7z 80 B. 20 - 5.5 g
3955

3956 B 26 Scaft. " 6 gr
3957

3958 } B 45 non py 5Hg0 " 3 g
3959 }

3960 } B 45 Scaft - " 3.5 g
3961 }

3962	1425	1680	
3963	1485	1755	
3964	1600	1730	S
3965	1600	1770	"
3966	1560	1675	S
3967	1730	1805	"
3968	1620	1770	
3969	1575	1685	
3970	1565	1840	
3971	1550	1675	
3972	1675	1925	S
3973	1655	1965	
3974	1445	1665	S
3975	1510	1775	"
3976	1515	1775	S
3977	1550	1875	"

3962, 3963	B 46 non p 5Hgo	80 Fe 20 Bi	5 gr
3964, 3965	B 46 Self H.	"	5 gr
3966, 3967	B 47 - Non py 5Hgo	"	5 gr
3968, 3969	B 47 Self H	"	5 gr
3970, 3971	B 48 non p 5Hgo	"	4 gr
3972, 3973	B 48 Self H.	"	4 gr
3974, 3975	B 49 Non pyro 5Hgo	Fe 95 - Bi 5 -	4 gr
3976, 3977	B 49 Self H 5Hgo	95 Fe 5 Bi	4.5 g

3978	1570	1740	S
3979	1570	1790	"
3980	1635	1850	S
3981	1690	2015	"
3982	1530	1795	
3983	1530	1850	
3984	40	55	
3985	370	450	
3986	545	685	
3987	275	350	
3988	870	1285	
3989	375	530	
3990	600	935	
3991	925	1065	
3992	195	225	
3993	195	225	
3994	85	95	
3995	80	90	

3978 } B 50 non py 5Hg0 90Fe 10Bi
3979 } 4 gr

3980 } B 51 - non p 5Hg0 4 gr 99Fe 1Bi
3981 }

3982 B 51 Sec fh "
3983 4 gr

3984 } G 16 - non py 80Fe Wo 20
3985 } 4 gr

3986 } G 16 Sec "
3987 } 4 gr

3988 } G 21 non py 5Hg0 Fe 80 Wo 20
3989 } 5.5 gr

3990 G 29 - Sec fH. "
3991 5 gr

3992 G 36 - non py "
3993 3 gr

3994 } G 36 - Sec "
3995 } 3 gr

3996	1355	1800
3997	1350	1675
3998	1450	1760
3999	1395	1630
4000	990	1280
4001	1085	1570
4002	1345	1930
4003	1395	1955
4004	1535	1990
4005	1500	1800
4006	465	675
4007	500	765
4008	735	1110
4009	750	1180
4010	1385	1745
4011	1335	1625

3996 } G 39 nonp 5 H_2O Fe 80 W 20
3997 } 4.5 gr

3998 } G 39 Sec H "
3999 } 5 gr

4000 } G 42 non py "
4001 } 4 gr

4002 } G 43 non py "
4003 } 5

4004 } G 43 Sec H 5 H_2O "
4005 } 5 gr

4006 } G 44 nonp "
4007 } 5 gr

4008 } G 44 Sec H "
4009 } 4.5 gr

4010 } Glass 20 nonp Fe only
4011 } 4 gr

1/2

4012	1300	1475	$
4013	1430	1590	
4014	465	900	
4015	500	1025	
4016	235	475	
4017	235	475	
4018	45	70	
4019	50	75	
4020	80	115	
4021	80	115	
4022	1070	1495	
4023	1160	1625	
4024	1040	1245	
4025	1100	1430	
4026	1055	1865	
4027	1150	1935	
4028	1000	1645	
4029	1025	1700	

4012 } Shooter 20 Self Fz only
4013

4014 } Shooter 21 - Fz 60 Sb 20 5Hg0
4015 } 5 gr

4016 } Glander 21 self ff "
4017 } 4 gr

4018 } Glander 22 non pg Fz 80 Cu chrom 20)
4019 } 45

4020 } Glander 22 self ff. "
4021 } 5 gr -

4022 } W 57 non Fz only
4023 }

4024 } W 57 self ff "
4025 }

4026 } W 58 non pyro "
4027 }

4028 W 58 self ff "
4029

4030 } W 64 non pg
4031 } Ex Fe direct from the ore

4032 } W 64 secf "
4033 }

4034 } W 65 non p Fe only ore expt
4035 }

4036 } W 65 secf "
4037 }

4038 } W 66 non p Fe only ore expt.
4039 }

4040 } W 66 secf "
4041 }

4042 } W 67 non "
4043 }

4044 } W 67 secf "
4045 }

4046 } W 70 non "
4047 }

4048 } W 74 Non 7z Cu Ore expmt
4049

4050 } W 74 Self "
4051

4052 } W 76 - Non py 7z only ore expmt
4053

4054 } W 76 Self "
4055

4056 } W 77 Non py 7z Zn ore expmt
4057

4058 } W 77 Self "
4059

4060 } W 84 Non p plain non
4061

4062 } W 84 Self "
4063

4064 } G 20 - Non 7z 80 W 20
4065

4066 / 4067	G 30	Self A,	F280 W0 20
4068 / 4069	G 31	non	"
4070 / 4071	G 31	Self	"
4072 / 4073	G 40	non	"
4074 / 4075	G 40	Self	"
4076 / 4077	G 42	Self	"
4078 / 4079	G 46	non	"
4080 / 4081	G 46	Self	"

4082 } 4083 }	G 47 non	7260 W020
4084 } 4085 }	G 47 self	"
4086 } 4087 }	G 50 non	"
4088 } 4089 }	G 50 self	"
4090 } 4091 }	G 51 non	"
4092 } 4093 }	G 51 self	"
4094 } 4095 }	G 52 non	"
4096 } 4097 }	G 52 self	"

4098 / 4099	G 53 non	7280 Wo 20
4100 / 4101	G 53 Seef	"
4102 / 4103	G 54 non	"
4104 / 4105	G 54 Seef	"
4106 / 4107	G 55 non	"
4108 / 4109	G 55 Seef	"
4110 / 4111	G 56 - non	"
4112 / 4113	G 56 - Seef	"

4114 } G 57 non 8072 20 Wo
4115

4116 } G 57 seef "
4117

4118 } G 58 non "
4119

4120 } G 58 seef "
4121

4122 } G 59 seef "
4123

4124 } G 60 non "
4125

4126 } G 60 seef "
4127

4128 } gluten 25 seef 8072 Sb 20
4129

4130
4131 } Glauber 24 self-ff 80 Fe 20 Sb –

4132
4133 } G 59 non Fe 80 Wo 20

4134
4135 } Glauber 24 non py Fe 80 Sb 20

4136
4137 } Glauber 23 self-ff "

4138
4139 } Glauber 23 non "

4140
4141 } B 50 self-ff Fe 80 Bi 20

4142
4143 } B 52 non "

4144
4145 } B 52 self "

4146 } B 53 non Fe 88 Bi 20
4147 }

4148 } B 54 nmpy "
4149 }

4150 } B 54 seef "
4151 }

4152 } B 55 non "
4153 }

4154 } B 55 seef "
4155 }

4156 } B 56 non "
4157 }

4158 } B 56 seef "
4159 }

4160 } B 57 non "
4161 }

4162 } B 57 scif H - 7680 B1 20
4163 }

4164 } B 58 non pyr "
4165 }

4166 } B 58 scif "
4167 }

4168 } B 60 non p "
4169 }

4170 } B 60 scif "
4171 }

4172 Reg 5 gm non assembled with 2
4173 whole pkt, run on hot test.
Enhanced 21% KOH. 2 gm di OH.
4174 End call

4175 Dup 4172
15% Na OH, 2 gm Li OH.
4176 End call —
4177

1.62 run on cartridge
6.29 nickel group

#1059 Fe Loaded by big machine
4178 } bump 100 Corrugate 100
4179

4180
4181

4182
4183

4184
4185

4186
4187

4188
4189

4190
4191

4192
4193

7.15
1.800
14.5
7.15
8.5

6.05
1.800
14.0
4.4
5.4
89%

3 | 1609
5.36
179
7.15

89%
5.39

3 | 1619
5.39

[ITEM FOUND IN BOOK]

90 Fe, 10 Sn	5 Hgo	Self Heated		1675	Platinum Co
~~85 Fe, 15 Sn~~	~~5 Hgo~~	~~Self Heated~~		~~1695~~	~~Platinum Co~~
Fe Stannate	5 Hgo	5 gram	Non Pyro	1025	W
"	"		Self H.	1250	W
80 Fe, 20 Sn	5 Hgo	4 gram	Non pyro	900	W
dito		5 gram	Self Heat	1050	W
dito		5 gram	Non pyro	915	W
dito		5 "	Self H.	805	W
do		5 "	Non Pyro	985	W
do		5 "	Self H.	1015	W

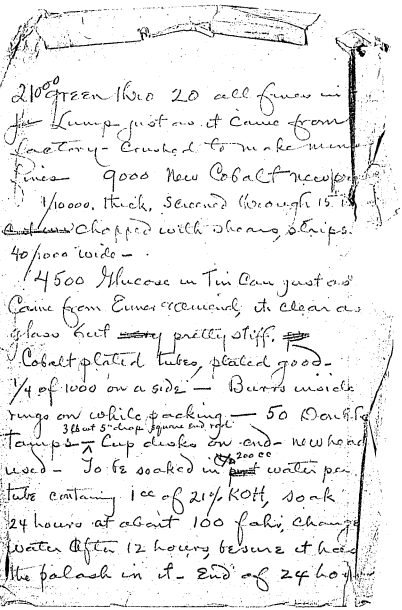
[ITEM FOUND IN BOOK]

			Highest	
80 Fe, 20 Sn	5 Hg 0 5gr	Self Heat,	2170	G
80 Fe, 20 Sn	5 Hg 0 5gr	Non Pyro	2517	G
80 Fe, 20 Sn	5 Hg 0 5gr	Non Pyro 4th Extra Economy test for Hollow)	2899	(mid run
80 Fe, 10 Bi, 20 Sn	5 Hg 0 5gr	Non Pyro	2685	
80 Fe, 10 Bi, 20 Sn	5 Hg 0 5gr	Self Heat	2650	
70 Fe, 30 Sn	5 Hg 0	Self Heat	1935	last run CO
70 Fe, 30 Sn	5 Hg 0	Non Pyro	1875	last run + CO

[ITEM FOUND IN BOOK]

75 Fe / 25 Sn } 5/Hgo	Self Heat		1600	lastrum+Co
75 Fe / 25 Sn } 5/Hgo	Non Pyro		1135	
95 Fe / 5 Sn } 5Hgo	Self H		1587	
95 Fe / 5 Sn } Hgo 5	Non Pyro		1135	lastrum when Co
90 Fe / 10 Sn } Hgo 5	Non Pyro		1340	lastrum when Co
85 Fe / 15 Sn } 5Hgo	Non Pyro		1240	lastrum when Co
65 Fe / 35 Sn } 5Hgo	Non pyro		2000	on lastrum Co
65 Fe / 35 Sn } 5Hgo	Self Heat		2242	

[ITEM FOUND IN BOOK]



2100 green Iwo 20 all fines in
the Lump just as it came from
factory - Crushed to make more
fines - 9000 New Cobalt received
1/10000. thick, Second Wrought 15 B
~~and~~ Chopped with shears, strips.
40/1000 wide -
4500 Illuvase in Tin Can just as
came from Emerson, thick as
glass but ~~very~~ pretty stiff. ~~[illegible]~~
Cobalt plated tubes, plated good -
1/4 of 1000 on a side - Burns inside
rings on white packing - 50 Double
Tamps - 3 lb cut 5" chop square end right
Cup chokes on end - new head
used - To be soaked in ~~pure~~ 200 cc water per
tube containing 1 cc of 21% KOH, soak
24 hours at about 100 fahr, change
water after 12 hours because it heats
the potash in it - End of 24 hours

Notebook, N-07-01-08

This notebook covers the period January-November 1907. There is also a 2-page entry from January 1909. The book was used by Edison, laboratory chemist Olav Berg, and an unidentified experimenter to record notes regarding the preparation of iron-bismuth compounds for storage battery experiments. Several entries note the involvement of Otto Groethe. The 1909 entry pertains to the use of solvents in the manufacture of phonograph cylinders. The front cover is labeled "Important," "Edison Bismuth & [?] Expmts-- Iron Bismuth mixtures Olav Berg," and "Edison Special Tube Experiments." The pages are unnumbered, and the book has been used in both directions. Approximately 190 pages have been used.

The material not selected is a log of compounds prepared by Olav Berg according to Edison's instructions.

July 28 1907

Berg:

Dear Dr Brother Cook –

I want you to work one Iron Bismuth mixtures

4 oz of dry mixture is to be sent to Silver Lake for reduction by Hydrogen

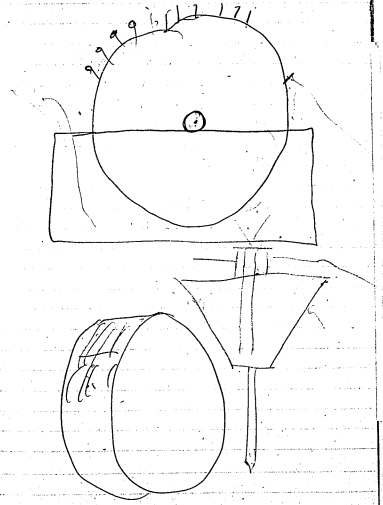
1/2 of the sample will be reduced self heated The other 1/2 will be run in Hydrogen so it will be non pyrophoric, Both will have 5% of HgO added –
The proportions should be 80 Iron 20 Bismuth
Two test packets will be made for Each 1/2 The results will be sent to you so you will know what the results are –

Read Carefully what I say about

Iron oxide in Dr Grathes Book—

Record clearly & plainly in this book just How each sample was made so that at any time it can be duplicated,

Any Bismuth salts you want order thro Mr Randolph.



Soaking Bi in green Exp to Oct 29 1907

No 1 708 green soaked in Sol 800 cc contain 120 grms Bi metal used 80 cc quite little liquid above green — poured off all cooled lamped dish — then put in paper to dry soaked 10 minutes no wash — Sol is very Conc $BiCl_3$ NH_4Cl NH_4 to make it as neutral as possible — its acid & deals on a little Ni —

No 1 Cakes together quite hard on drying —

Notice lots green pieces & not reduced Lice Turn — probably showed have used conc formed in little KOH — small bulk as at No 3 — Think No 1 want acid because dident put enough KOH into take Conc of Cl a formic —

Poor Lot —

Dried and lamp reduced

Black in many lots green patches unformed

No 2 Same as No 1 Soak 10 min -
but one quick wash —
dried —

Reduced formaldehyde + Excess of
21% full strength — plenty formac
This reduces clear blue apparently
& is better made than No 3 —

This is Great reduced lot of
1 2 + 3 —

Washed & dried in air and
temp all night

I find in the morning that it is
green — Evidently not washed Enough +
Bi oxide or something —
No 1 & 3 are black. 3 is the
best + is OK

No 3 soaked about 14 minutes
washed 3 times with plenty
water - stirred it with finger
dried

Reduced formaldehyde only little
KOH use little liquor & strong
formaldehyde as it does better than
use to much bulk of liquor
with same formald -
Even after 5 min heat not
reduced only little ways in
while nearly boiling. I found
liquor was only about acid
probably added more KOH,
Went kind of spoilt or not,
went acid again after putting in more
KOH - added lot KOH & think it will
not go acid again - Waste data
21% undiluted to take care of acids
& tested from time to time as it is
necessary to see if strongly alkaline

Dried overtemp all night
Black & good in the morning

No 4. 60 cc of the ROH Bi glycerol
Sol — soaked 10 min powder —
tamped no wash — Dried —

green reduced by formaldehy
& some ROH, seems to reduce
all through —

When washing cold water
OK but when washing hot
water & white stuff clouds
the water. This is probably
some organic material & wide
probably kill this Solution,
If just the white stuff is only $Ni(OH)_2$

I soak it in handle slush
full water and put on a clean
6 oth all night

No 5 glycerine BioHRON Sol
Soaked 10 min —
One quick wash — dried
No 5 seems as if it had little
finer mesh grain —

Reduced formaldehyde + KOH —
seems reduce all through —

Same white cloud on
white wash water
as noticed in No 4

Put in handle dish & soak
all night on steam plate.

washed it twice in morning
dried — dried gray — generally
it may be good & grey being
more metallic than dead
black there are some green
pieces —

506 -

Tartrate Bismuth dye strong in 10% KOH, then diluted to 5% KOH, soaked 10 min - 2 quick washes. -

Reduced by Formaldehyde in weak KOH - without drying the green - had renew KOH 3 or 4 times as it tended to go acid,

Dries gray black - pretty rug -

No 7 -

BiCl3 NH4Cl Conc very slowly
Sol. Nitrate K somewhat crystalized out
from Heat used in 445' —
Soaked 10 minutes — Whole
2 quick washes plenty water.
gaber large amount KOH xyl.
pour off & rinsed — dried —

Reduced - by Hypophosphite Na &
15% KOH - boiling only shows
signs of reducing after boiling
10 minutes with watch glass
over top of handle dish —
poor reducer I guess -
Cant reduce it —

I find that above can be reduced ok with
only little heat if 21% KOH + Crystals of
Hypophosphate are used + no water —
after heating it goes black quick
and then continues going + I am poor
reduction by heat only from ~~[illegible]~~
on hot plate — The whole of 107 left
I put in 21% KOH. with some hypophosphite
reducing hot after test shows metal black all
times - put in fresh sol KOH + plenty hypophosphite put
upon 3 hours warm - washed water then KOH.
then alcohol + dried all night oil lamp —

Reduced by hypophosphite

Diamond Rubber
33% ash —
4.09% Silica
0.55% Al_2O_3 —

8 708

Conc $BiCl_3$ NH_4Cl. soaked 15 min

then Tamped & all solution possible got off then Washed in water twice — then transferred to largest handle dish & soaked 3 or 4 times in large quantity water to remove Chloride ammonium —
set out to dry and temp all night —

Dries dark slate together has same color as original 708 —

I notice towards last
when KOH disappeared
& green was free of KOH,
that there was considerable
Bi OH yellow float &
seems weak KOH tends to
make the yellow probably
BiOCl is not decomposed well
by strong KOH but only by
weak KOH or long boiling
at 1st float colored —

green as it went in Tubes
No 9 — has 28.6% Bi as metal

7.05 — Soaked 55 minutes in mixt
Conc Sol of BiCl3 NH4Cl then poured
all off pounded, lumps several
times then a quick cold
pour & lump — then dried —
it clung a little together (1c)
lumps — put in about 10%
KOH, boiled 10 minutes about
then poured off & precipitated
3 times till no KOH by litmus
Each time put on hot plate
& allowed 1 day 2 hours or more
Now drying on hot plate,
evaporated — I used Cl. minimum
quantity of Bi solution —
just enough to cover green —
after drying put green into
fresh BiCl3 NH4Cl Conc & boiled
another 55 minutes poured off
lumped & poured then one quick
wash — dried — after drying & while
quite hot put into KOH solution
boiled 10 minutes — then poured
off & so on each time nearly boiling
water, until phenolphthalein showed no
KOH — dried —

Regeneration —

Cell 5365 =

Poured out the 21% NaOH, it was set aside in a filled with water, put in half plate solution nearby boiling — put in 3 o'clock Saturday PM — on all night — changed water at 9 am Sunday 10 or 15 drops 21% NaOH put in water — since 9 am been on bare now without plate — on bare plate until Tuesday 9 am Then put it — 21% NaOH — sent to Hoagy for running Regular — Marked 5365 A —

No 10

706 Soaked in strong ammonia & heated on hot plate —

fresh water from time to time between each water remains on hot plate till nearly boiling — when can just smell NH_3 look out for fumes — probably should have been washed free NH_4 it must combine with NO_2 as it comes out so slow —

Dried all night and Temp

No 11 Greens as used in tubes has 15.33% Bismuth as metal —

Soak 55 min in Conc HCl & HNO_3 mixture gradually — Then quick wash + filter several times, plenty water, boiled each time until only little Cl by $AgNO_3$ dried — dried all night ordinary temp.

Regeneration

5837 = Tuesday 10 am poured out Electrolyte - put in water & put on bare hot plate,
1130 took elements out & disconnected
nickel - immersed it in Can with 100 mlg KCy & put on heater
at 1 pm immersed the Ni in test tube with water & 100 mlg KCy for ½ hour before immersing Ni in Can

Before putting in Can put H_2O & 15 grms KCy in Can & set on bare hot plate to wash out anything in or on Can that might absorb any of the 100 mg KCy —

at 1215 PM put it in Can with the 100 mlg Sol & filled with water put glass cup over top - put on hot bare plate —

830 Wednesday poured out sol & put in H_2O with some KOH & heated
at 1115 AM poured out & put in 21% KOH set aside in C & CO
Thursday 8.30 AM cut up alums to Go assembled 5837 A —

5653

10 am Tuesday

Poured out electrolyte put in water & put on bare hot plate.
at 1220 Took M Electrode out & put in Sol Containing few drops KOH & 500 mlg Hypophosphite Soda in test tube —
also washed out hot the metal Cell with Sol Containing Considerable Hypophosphite Na & Little KOH.
Then rinsed Cell out & put in test tube Sol & Electrode in Cell set on hot plate with glass cover over at 1245 PM
Tuesday Wednesday May 830
poured out Sol put in fresh water & some KOH. Soaked till 11 15 am
then poured out & put in 21%
KOH & set aside Cold —
Thursday 830 am sent up to Jones it assembled & sent up Stevens
Marked 5653A

No 12

50 grms 708

100 cc H_2O Containing 20 grms

$NiCl_2$ – dried, no KOH, then put in tubes, then tubes boiled KOH 10% till free KCl then washed 21% KOH 4 times – The $NiCl_2$ is to stiffen green in Tamping or afterwards squeeze the green to keep Cinla ab

95 soaked green in Sol 40 min

boiled in KOH, then soaked out KCl & then put in 21% Sodium oxy till Monday – decided only three KOH are – 8190 91 92 – 21 KOH
8193-94-95 21 " 2 KOH.

No 13

Green 708 - Soaked Cone

Solution KCl - dried -

Tubes made + KCl soaked out, in alkaline water.
Then soak 21% KOH + run
Then go to stiffen green when
Tamping

75 Soaked green in sol 40

Put in 21% KOH after KCl soaked out, put in 21% K Solution Tu 62
Soaked till monday

Now are 8196 - 7 - 8 21%
8199 - 8200 8201 " 2 21% KOH.

14

Dup 13

Except Conc Sol Cond Saturd
tube. mud & ~~K~~ K_2CO_3 soaked
out in alkaline water

Soaked green in Sol 40 min

Soaked out K_2CO_3 & then
put in 21% KOH, Saturday to
Soak till Monday

Nos are 8202-3-4 | 21% KOH
8205-6-7 | " 2 KOH,

15

Dup X012

Except 100 cc water in which 20 grms $Ni.SO_4 7H_2O$ dissolved –
Soaked in sol 6 hours poured off – 1 quick wash then put out to dry

Dried partially on hot asbestos then out and lamp all night.

This is to be made in tubes & tubes boiled KOH & SO_4 previously out.

No 16

Green 708 Soaked Saturated
Chloride Barium — 1 quick
wash - dried - put in Incu -
5% Sol Carb K soaked 1.C.C
pores filled with BaCarb -
Wash well - dry —
Soaked green in Sol 40 min -
washed Chlk out by several hot
washes - put out to dry
all night —
to be made in tubes of
use

17

Dup 16 but use
Chloride Strontium —

Soaked green in 0.1 N 40 min.
by K_2CO_3 —
Washed KCl out. Several hot
washes — put out to dry
all night —

to be made in tubes & used

18

Not – Soaked in 21 o/o
KOH Containing 5 grams
Iodide K – put on hot
plate – on hot plate 6 hours
taken off put on table all night
in morning – solution poured off
& H_2O put in a tubes all day
in dark on some hot plates
finally cooked & dried all
night –

19—

708— Soaked in Conc
Mercuric Chloride —
Soaked same as 18 no KOH.

20

708 Soaked hat in Mercuric Chl in Ethyl alcohol Concentrated

Soaked Ethyl 5 hours carbolic washed dry put fresh Ethyl Soaked del night Then poured off & washed twice fresh Ethyl finally used H_2O all day Several times. bare hat plate Dried all night

21 —

708 Soaked in
21% KOH, Containing
3 grms Alumina in 100
cc KOH 21% —

Manipulated the same
as 18=1 No KOH,

Dried all night —

22 –

708 Soaked in Conc SO_4
NH_4Cl, NH_4 + Excess $Ni(OH)_2$
I evaporated some + found
plenty Ni in it —
after soaking dry +
then boil KOH, 50% —
Eliminate NH_4 + Cl —
washed once hot +
dried all night —

5913

This tube has seam pulled out top 1/2 inch - Tested on 3 hap near night - after soaking out in original cell - two changes water - found color tube silvery - grid brown but wipes off & silvery —

Put in 125 mlg KCY in Can & put on hot plate — ~~silvery~~

Monday - put it fresh water a few drops KCY,
On 1 hour put in 21% K
dent up slant

5819-A

Has tube dark red don't rub off - grid peacock

Was soaked same as 5913

put in 125 Mil/KCy in Can on hot plate

Monday put it in fresh water with few drops KOH.

Dark red tube 50 ill Cy peacock grid

soak for hour then in 21% KOH pass up stairs

5820 A

Tube x grid gold yellow

Soaked same as 5913

125 mlq KCy in can

on hot plate

Monday – Mag pick in funnel

water + few drops KOH,

soaked 1 hour then put

in 21% K sent up Slater

5864 Tube & grid bright

Soaked out same as

5913

Soaked in Cam on hot

plate 125 mlg KCy

Monday put in fresh
Wed. few drops KOH,
1 hour put in 21% N
Rest up 8 days

5653 B –

formerly soaked hypophosphate

Na – Mg – Nodes soaked first twice in Water – of Chem

Soaked all night in 125 Mlg KCy –

Dal slightly alkaline –

In mng found it not alkaline a sound Harrow clots on grid –

5365 = formerly washed out hot
from as A —

Now soaked out twice in
H_2O & then put in 125 mlg
KCy all night sol slightly
alkaline

found sol in neng not alkaline —

5365 B = soaked in test
tube with 250 mlg HCl —

5359
5360
5361
2491
2492
2493
} B

All soaked out then put in half H_2O + 125 mlg KCl soaked 18 hours hot as boiling + ~~[illegible]~~ then 2% KOH soak up blacks

all above solutions alkaline [illegible]

5359 C soaked in ~~test~~ tubes with 250 mlg/ HCl —

7527 — There is matter on surface on tube —
Soaked 125 mlg. RCy
all night
found Δ of not all Radium missing

E18- Nickels only

Grat over by Sadley

Monday —

Soaked out 3 times

last time water 70°C

Alkaline — at 1130 am

Tuesday put in 36 grams

KCy & set in Asbestos -

at 6 pm set it in Labb

close to hot plate to

soak all night in the KCy

Sol —

5872 [redacted] —

To be washed in 200 milligrams of fluoride ammonia made alkaline with NH4 — heated [illegible] in CCl4 — soaked out — [illegible]

7896 7897 — A —

Soaked out — put 125 mlg KCy
in — soaked all night —
friday morng put in an other
dose of KCy 125 Mlg Emch —

No 23 — 75 grm about
708 - Soaked in platina
dish Conc Sol of
fluoride ammonia
Soaked 4 hours washed
out — on paper all night
to dry —

5822 - A

Soaked out KOH, except slightly alkaline - Then at 10 am today put in H_2O containing about 1 gm Fluoride Ammonium made alkaline slightly by Ammonia - put in heat incubator -

Water got low 1/2 way down the tube & obliterated Number think I have the right one found remaining - placed in Zat off Epp feed grid -

~~5913 Opened up at top — small crack also~~

5864 A Soak out then H_2O added made shade alkaline & 250 cc KCy added —

5820 A soakout then H_2O added KOH made shade alkaline then 350 mlg KCy

5913 A - ditto added 450 mlg KCy
Split & opened at the top - 1 ring off
Close straight to top end

5819 A - ditto added 600 mlg KCy

2491-
2492 } C =
2493

Soaked out well in H_2O

then once in Ethyl —

Then at 11 am - put in Ethyl
Containing rather large quantity
$HgCl_2$ = } to reduced to
Hg + Calomel —

Out at 1.40 - grid + Tube
Clean - globules of Hg all over
Washed off far as possible
Water - put soak water
at 1 42 pm —

Seems as if nitrate
Decomposed —
after 13 min - H_2O rolling } come out
put in 21% ROH —

5361 C =

2 pm in ~~test~~ tube in H_2O Sol of strong $HgCl_2$ = Thro grid & tube cracked & red yellow closely adherent film which previous treatment did not remove — out at 3 pm — film off grid & off tube except in few small spots — semi amalgam'd — some Calomel shows on grid — Now soaking water — put in 340 put in 21% KOH

5360 - C =

Put in test tube with 200 mlg HCl. 5 hours — soaked further 20 min then in hot boiling 5% KOH.

5653 = C = Same as 5360 - C

Edison No 33

Edison 34

made

new tubes.

No 2 - not heated - soaked Conc $BiCl_3$ 24 hr. 10 minutes - dried - then ~~[illegible]~~ put in 21% ~~then~~ 15 min aft then in 5% NaOH & boiled in cell in hot plate for about ——— then Chloride pressed out

No 1+3 heated 1 min @ 120 Fahr. aft then soaked 10 min same sol & manipulated same as No 2

This forms one group — Lot metal Bi deposited 708 grams

No 16 - Not heated soaked 10 min & manipulated as above

17+18 Heated 5 min - 140 F aft immersed slowly & rinsed sol but by mistake stayed in 35 min — after washed manipulated same as above — Very much Bi metal deposited

This group is 719 Rec 2 hour drain in 60 go

Made N024 Edison

719 RQ 2 hour draining fellow

10 min soak in Conc $BiCl_3$ NH_4Cl — must
drained off as far as possible, no wash
out drying on paper = then ~~[illegible]~~
in 21% KOH, then ~~[illegible]~~ the ~~[illegible]~~ after
5 min put on Bunsen & Bunsen
burned & diluted to about 5%
or 6% & brought to boil for 10 min
then poured off & put in water
only — brought to boil —

PS = after drying on paper till dry
put on asbestos hot plate for 20
min before putting in 21% KOH,
it went — a little hot —

Changed H_2O several times not
much chloride present —
out on paper drying for —
the night

breaks up to 1/2 size — probably work
ok if screened thru 10 mesh —
then soaked it would probably
break to 20 mesh or finer —

705 dont break like this, mostly breaks at
cell — in using out KOH dont get yellow flood
like in 25 because did heat high enough long enough

Made 1540 No 25 Edison

719 Ra 2 hours drained —

10 mm — most Conc Bi Cl3 Ethyl Cl —
~~Dr~~ then washed twice with
Conc Sol of Ethyl Cl — Then dried
This will dry all night on paper

Notice this one has yellow float
from heating longer before washing
out the KOH

Guess that in washing out the
KOH from these Bi juices of
fine dust heat beyond light for
long time the Bi will not
go easily drops No 24 did not
show yellow float so I guess
its not easily Bi.

1540 Mc

105° Metallic Bismuth
Dr Gratta assay

Made

N° 26

Old Cad 2 18 45 amp Capacity
Nickels only percolated with KOH
in water for 3 days - last
water was alkaline to
prevent rusting - Put in
fresh water containing
15 CC of Conc HCl -
put on Saturday 10 30 am -
Sol acid - at 1 pm. gone
neutral - poured off sol
put in H_2O only let it stay
in 1 min as grids were brownish
from oxidation - Then put in
KOH, perhaps 3 @ 5% + put
on month at plate -

I should have dried the plates
& then put in H_2O with the
acid. This may not come up
first to no criterion of success
of a treatment

Edison 27 Made

719 RA 2 hour drain —
Soaked 10 mins 1/2 strength of
Reg Conc $BiCl_3$ NH_4Cl Sol used in
Edison 24 + 25 =
made by diluting with Conc NH_4Cl —
put in 80 cc of sol in 3/4 oz
glass cell measuring — leaving 1/4"
freeliquid above green in Evap
dish — Scarcely any gas comes
off — probably due to not having
residual NaOH Carbonated

flint yellow —

Soaked 10% ROH — washed out
KOH —

Edison 28 Water

Same as 27 except 708 green used — more gas comes off than 719 — in fact 719 gives scarcely any gas whereas 708 gives great amount probably due to carbonating of residual NaOH, — 719 being fresh & not carbonated & yellow

Did not show yellow float.

Boiled ROH - washed out

29 Made

719 Ra 2 hour —
Soak 19 minutes
1/2 strength Bi Sol —

Drained + clean 2 quick washes
with Conc NH_4OH
dried — then KOH, 10% all night.
Cold —

Float yellow

Boiled KOH, washed out

30 Made

Drop 29 Except 708 used

float Not yellow

Boiled Not, washed out,

708 soaked in pretty Conc Barium Chloride – ~~then~~ 20 minutes – then poured & tamped then dried –

After drying soaked in pretty Conc Sulphate Soda to precip $BaSO_4$ –.

Only small quantity left in form of $BaSO_4$ – must use very Conc solution try it again ~~later~~ I used acid on tray KCl seems to be plenty of $BaSO_4$ as much as Bi

After soaking 2 hours in Na_2SO_4 washed out rinsed 5 times H_2O in H_2O all night washed more in morning – then put in 5% KOH, warm, washed KOH out then dried

Urine

32 –

708 – Nearly Conc Bacl
To be soaked 1½ hours then dried
+ precip by Na_2SO_4 – Washed then
dried ~~& soaked by [illegible] Bacl~~
~~dried & reprecip by Na_2CO_3 –~~
~~Washed + dried~~
~~After the Copper Conc [illegible]~~
~~[illegible]~~ – no Tea
green soft + swollen as
precip expanded & burnt
green particles,

only one precipitn – so it swelled
normal – after washing
several times, the swelling
goes down – good deal
sticky float probably
lot of filt~~ed~~ float –
~~[illegible]~~
The Bacl + Nelsey Tod Conc
about 6/10th of the Conc would
be enough + a 2d soak
probably unnecessary
~~In~~ Can't remember but think it
not ~~[illegible]~~ Heated KOH –

~~[illegible]~~

5819 } Kott got nearly out
5864 }

then dried a cobalto hat immersed
in 50 cc H_2O Containing 500 mlg
Conc HCl — warm 20 minutes
soaked in water —
Mark, C —

5822 }
5820 } Kott nearly all out
put in 50 cc H_2O Containing 1.250
grms HCl — notice some black
came out in 5 minutes & settle
bottom test tube —
Soaked 20 min

Mark C —

5913 - split out top - bottle open
50 cc H_2O Containing 10 grms HCl —
grid hot dipped 1/2 min then put in
water —
Mark C

~~338~~ Edison 35-

719 RL Soaked Conc Soap Anthracene
in Benzol- Dried —

36-

719 RA - soaked Conc BaCl
dried, quick on asbestos - plate very
hot only 1 or 2 15@20 min —
then soaked Conc Na_2SO_4 — dried
asbestos quick — Then soaked
again BaCl Conc dried, then
soaked again Na_2SO_4 — let washed
it & then put in Tall Beaker
to soak all night —
Breaks up in boiling
get too much $BaSO_4$ in ppt
guess

Think it would be ok if
had percolated out the
1st soak of Na_2SO_4 —
but leaving so much
$NaCl$ in broke it up to
40 mesh —

37 =
7/19 - Saturated BaCl soaked
at 1125 am stood dry 12 noon
dried put in Cone KSO4 at
1246 dm - pound off 2 25 pm
put in H2O at 225 - 5 pm out
to dry all night.

2nd Soak 1015 am Dry
at 1105 soaked KSO4 at
1155 - at 1220 started
washing acid clear hot
long time many changes

1 lb Lithia Carbonate
will make .6477 lbs
Li OH –
to make 100 lbs Li OH solid
requires 154 lbs
Li_2CO_3 —

38

719 RA in saturated sol ortho phos
soda, very faint acid —
in soak in phos Na ortho – at
1130 am on drying 1205 in Conc BaCl
115 pm poured off 2 25 pm put
in water at 5 pm out dry all
night.

Resoak 2nd 10 15 am Drying
1105 – 11 am in BaCl 12 10 pm –
out at 1235 – washed many
times – boiled – Cond prevent
big precip with $AgNO_3$ –
put in some KOH boiled
~~Had quiz it up + dry it~~
~~to probably Mg – the~~
~~Ag is yellow – to probably~~
~~phos the Barium decomposing~~
~~by hot water –~~
will try it any way

39 719 RA in Conc Sol Tungstate
Soda faintly acid —

Soak at 115 pm Drying 2 20 pm
in Ba Cl. at 320 put in H_2O at
345 pm at 5 pm put out to
dry allnight

2nd Soak — 10 15 Sunday am —
Drying at 1105 am in Ba Cl at
1205 out 1235 — long washing
many changes H_2O before
got it free from $Ag\,NO_3$ precip —

7/9 in Conc Sol Nitrate Uranium
faint acid reaction –
in soak 11 35 and drying 12 25 pm –
in KOH 21/2 2 20 pm then diluted KOH
w/s water & boiled in a little
for few minutes – dried all night
and temp – ~~[illegible]~~ to
~~[illegible]~~ & – went little
finer – decant make 2nd soak
~~3 [illegible]~~ short of solution

719 in Conc Sol Nickel Chloride neutral — in soak 1137 am out drying 1230 pm - one quick wash in 21% at 2 20 pm boiled little after 21% diluted to about 5 @ 7 - then dried all night, found that it had broken up to somewhat finer coverage much so did not attempt 2nd soak. breaks up much finer —

in at 1137 am Drying at 1230 1 quick wash - then in 21% KOH. after diluting KOH boiled, then washed free of KOH, Dried all night —

2nd Soak 1020 am Dry 11,10 am 1 quick wash — in 10% KOH. at 1220 boiled - washed free Chloride —

719 2 Hour drying

42 =
719 Soaked pretty Conc Molybdate
Ammonia - very slightly acid —
in soak in Molybdate at
1120 on dryer 1205 pm off
1250 pm in BaCl —
Washed many times hot
water & Couldn't get it
entirely free of ag precip
but nearly - think it
decomposes —

No 2nd Soak —

43 =

719 Ra 2 hour dreaming soak
Conc Chromate K = noticed when
poured on Mobil it turned very
dark Chocolate Color — possibly
Combn Colors —

Couldnt get it free from Chromate after
BaCl put in — after boiling long time
I had put in more BaCl + then by
long boiling + changes of water
got it so good very little precip
with AgNO3 —

Soaked Chromate K 1125 am —
Dried at 11 am ~~[illegible]~~ in
BaCl 1255 —
Washed + boiled, couldnt
stop precip as cited above
till I gave it fresh dose
BaCl — then got it nearly
free — Chocolate Color

1 Soak Only

44 =
Conc Strontium Chloride 719 Ra
+ KSO4 —

in soak 950 am out 1015
Dried put in KSO4 at 2 30 pm
put in water at 8 pm —
in water all night then wash
from many water flushed while
then dried — only one soak —

45 -

719 Rd. Very Conc Sol Stannate
Soda - 830 am. permed off 1 quickwash
Very floated Beef - soaked long time, effervescing
This breaks up to quite fine probably
50 mesh & hard to wash
Sungh: soak - probably not
washed well 4 mg

46 -

719- Conc Potassium Antimonyate
105gm dry, 195 gm in Bal 9 qm = soaked long time
then washed thoroughly

particles cling — dont break up
in the slightest — washed
well & think —
Amph2 soak' —

2492
2493
unknown — } Soaked in weak HgCl — then in water —

Mark II

47 7/9 2 hour drain —
Soaked 12 hours in Conc
Strontium Chloride —
Then drained off & dried on hot
asbestos plate —

Put in Zinc Sulphate Conc
at 3 30 pm — Renewed $ZnSO_4$
at 5 pm — drained off &
put in hot water at 6.50 —
pm — at 8 45 pm there was still
Considerable Chloride by
$AgNO_3$ test — Evidently
Oxycl formed which had
gradually decomposed

Noticed $ZnSO_4$ water got little green
it was probably acid —

48-

719 2 hours drain —

Soaked 2 hours in Conc Solution Strontium Chloride — drained — dried on asbestos on hot plate —

Put in Sulphate Magnesia Conc. at 3 30 pm —

Renewed the $MgSO_4$ at 5 pm —

at 6 50 pm drained it & started washing it free of acid. There is at 8 45 pm a little Chloride but not near as much as in 47

at 9 pm very little agel left out to dry all night —

Very little white comes off in washing which is different when KSO_4 used —

49 -

708 green

Soaked 2 hours in Conc Strontium Chloride -

Drained off & dried on asbestos on hot plate - at

150 pm put in Conc K_2SO_4

Removed K_2SO_4 at 3 35 pm

" " 6 10 pm

at 730 pm started washing with half water, at 9 o'clock scarcely trace ag. C.P. -

50 hours remaining Cl. - This shows great dif in porosity out on paper. To dry -

Made -

50 —

Ra XXX

Soaked Conc Strontium Chloride 2 hours — drained + dried on Asbestos on hot plate —
Put in K_2SO_4 Conc at 150 pm
Renewed " " at 335 pm
" " at 610 pm
+ Started washing with hot water at 730 pm —

RA XXX Soaked all night in Strontia Chloride. 9 pm till 9 am Sunday Drained - dried on hot plate aodaatoo, at 1030 AM Sunday put into Conc Chromate Potash to soak till Monday morning

$SrCrO_3$ unlike $BaCrO_3$ is sol in 500 pts water & may not work like $BaCr$ - of the good test tubes —

Cant Wash out Chrome - Well try it any way

52.

7/9 2 hours draining –
Soaked all night & until 9 am Sunday
in Conc Strontium Chloride – drained
Dried – put in at 10 am into Conc
Chromate of Potash – to 10 – 12 until
Monday Morning –

Strontium Chromate unlike $BaCrO_4$
is sol in 500 pts water + it
may not work

Can't wash Chrome out

MG

Abandoned

53.

7/9 2 hour drawing
Soaked all night in Conc Nitrate Strontia
on drying 9 am Sunday - put in
Sulphate of Zinc at 10 am to.
Soak until Monday

Washed B at water

54 =

7/9 2 hour — soaked all night in Cond Strontium Nitrate, out drying 9 am Sunday — in Conc Sulphate of Magnesium at 10 am to soak until 1 Monday morning

Washed Hot water

55

Soaked 2 hours $SnCl_2$ dried —
put in Phos Acid at 3 30 pm to soak
till Monday morning —

Washed & Saturated

56

'19 2 hours -
soaked in moderately strong Magnesium Chloride (Neutral) - soak all night - Monday dry + then boil 10% KOH. to deposit hydroxide Mg in pores of green —

57 =

Took some of 49 that was soaked in $SrCl_2$ + then K_2SO_4 & dried & — Soaked it in 1/2 strength of Bismuth Chl NH_4Cl — 4 hours — then drained & dried — put in 21% for 2 months then diluted to 10% KOH + boiled washed well scarcely any Cl yellow float lots of it -

58

7/19 – 2 hours

Soaked allnight from 5.10 pm till
9 am – monday in 1/2 strength
$BiCl_3$ NH_4Cl – ~~to~~ (ie) distilled till
most Conc Sol 1/2 = Monday
decant – dry & boil about hour
not less – actual boil – in 21% KOH.
2 min then dilute to 10%

Lot of ~~[illegible]~~ crystallized out $BiCl_3$ NH_4Cl
its mixed in funny hunt,
washed it well with Conc
NH_4Cl before KOH,

Not all the Cl out yet but
only a few –

59 =

719 soaked 2 hours
$SrCl_2$ dried —

Now soaking in Conc Aluminate
Potash — Monday wash out.
Boil —

Leached many times H of K_2O
Don't think it Clean scum on Top —

Will try it anyway —

It breaks up to 1/2 size
Thus strange — S

60 -

719, soak 2 hours Conc
$SrCl_2$ - dried, soaked all night
in ~~Hot~~ Conc Sol KSO4 -

Washed -

61

719 2 hours Soaked all night
18 hours in Conc Barium Chloride
drained - dried - put in Chromate
Potash 9 am monday —
out Tuesday morng 9 30 am | now
washing — all day in pot on iron
hot table — finally got rid yellow
coolar — green is dark brown out
drying 3 pm Tuesday

62 –

719 2 hours $SrCl_2$
dried Then, K_2SO_4 – dried –
This is 49 dot –
Now put in $SrCl_2$ again at 1015 am
out drying 9 am Tuesday
To soak in Sulphate of Magnesium
12 hours —

63

719 Ra 2 hour

Conc sol Magnesium Sulphate
in soak 2 pm Monday to Tuesday all
night — Dried —
Now soaking in Conc Strontium Chloride
all day & night till Wednesday
morning

64

719 Ra 2 hour
Soaked all night Conc Magnesium
Chloride — In morning
put in Phosphate Soln but dont
dry as Mgcl goes and just drain it
+ put in the phos Na
put in phos at 9 am —

65

719 Ra 2 hours

Soaked allnight in Magnesium Chloride
Drain it only dent dry &
~~then quick wash~~ with water
twice & put in Carbonate Soda
~~for 12 or more hours~~ —

66 Soak 12 hours or more in
Na Carbonate, dry —
then soak 12 hours Chl Magnesia
719 2 hours

67 Soak 12 hours. Carb soda.
Conc – dry – then soak 12 hours.
Chloride Calcium –
7/9 2 hour

68 Soak 7/9 2 hour

Phos Soda ——— 12 hours

dry — Soak 12 hours Conc Bath 2

69 719 Soak 12 hours Conc BaCl2 dry
then soak Magnesium Sulphate 12 hours

70 719 Soak in 2% KOH
12 hours, ~~[illegible]~~ dry — then soak
in ~~[illegible]~~ 1/2 Strength $BiCl_3$ HCl + Cl —
12 hours, closed bottle prevent
Evap —

Washed hot water.

71 Soak 719 12 hours phos Normal Sect
Sodi or K ~~[illegible]~~ quick wash - dry
then Soak 12 hours $CaCl_2$
Washed —

72

.719 Soak 12 hours $CaCl_2$
Conc — gold wash — dry — Soak
K or Na fluoride according to act Sol.
12 hours

73 = 719 2 hour soaked all
night in Sol made by using Nickel
Chl freed from iron by Hypo - The
Ammonia added until some Ni
hydroxide precipitated out, filtered -
Dried
Boiled long time KOH 10% but in 21%
for 3 hours on hot plate -
Washed free KOH.

74 Dup of 73 but
Wednesday morning Dry at
Resoak square at 12 hours
Put in Kott. bail - awarded.

75 =

Lot of 49 - finished

Now soaking all night in $Ni(OH)_4$ in Chloride NH_4 + NH_4 —
in morning dry then soak 21% KOH 2 minutes + pour off that add fresh 21% + keep on hot plate 3 or 4 hours then dilute to 10% + boil - or keep on hot plate with glass over to nearly boil for 1½ hours or so (see notes)

76 719 2 hours –

Soaked 1/2 strength. $BiCl_3$ NH_4Cl. 10 minutes drained + put in large quantity water, wash pass oxy chl off + dry and temp – then put in tubes + soaked 24 hours cold in 21% KOH –

77 = 719 2 hours —

Soak Conc solution Bismuth Trichloride in Acetone —
Soaked 1 hour 25 min — washed once with absolute acetone —
Dried — put up acid treated flake

78 Same as 77

Except $BiCl_3$ acetone solution
diluted by acetone to 1/2 strength,
put up with acid treated flake
soaked 2 hours 45 min —
drained & 1 quick wash with
absolute acetone —

79 -

Moore CP ~~Comp~~ unknown Conc B, Pg in
absolute acetone - pour from Iron
~~[illegible]~~ Put up with acid washed
flake. In soak 2 hours
45 minutes, drained one
quick wash absolute acetone,

80 —

7/9 2 hours

Soaked in 1/4 strength of $BiCl_3$ in absolute Acetone — not free from Iron — ~~[illegible]~~ out of $BiCl_3$ acid at 510 pm — washed once with acetone — Heated KOH, washed — finished —

81 = This was 1077 (numbered) —
after making some tubes
I took balance & used small
Evap dish 3/4 full water
added to it 50 cc of saturated
solution of $HgCl_2$ in water
& soaked organs in it one hour
then KOH, hot & washed

82 =

2 5 gram Irons soaked
— minutes in Conc CP
$BiCl_3$ in Acetone, (dark) ~~45 minutes~~
soaked —
to 62 put up 2 tubes Each

One with 2.10 ff 2 grams
one with 21 K ferrin —
~~Bad~~ washed with acetone —
dried several hours hot on
filter paper — put — KOH
21% —

83 a

3 Reg tubes loaded 7/19 2 hours
KO_3 1/2 of acid strength —

Tubes soaked 1 hour 20 min in
Conc Sol free from of $BiCl_3$ in acetone
washed quickly in acetone
dried on carbon & boiled KOH.

21% KOH. 4 tubes. —

The $BiCl_3$ acetone sol is evidently
~~decomposing since it stands~~
somewhat bedimmed & some
dark precip floating —

5 more soaked in same strength
Sol — should have been 1/2 strength
Made on Nutlake — soaked
1 hour 20 min —

84- 719 2 hour

Soaked in Tetrachloride Tin in acetone — at gradually colors acetone red — soaked 20 minutes — dried — then KOH, — wash out ~~[illegible]~~ not free Cl — out dry

oil

85 —

7/9 2 h

In Conc $HgCl_2$ in H_2O, soaked

35 minutes dried — then in

NH_4 to make ~~white~~ white precip

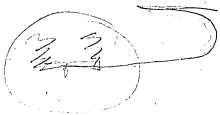
~~Coarse~~ in pores of green

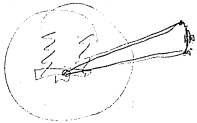
been in KOH,

now washing —

Friday morning finish the washing

CR —





86 =

719 · 2 h —

Nearly Conc. Stannous Chloride
in Acetone — Soaked 3 hours 25 mm
dried Hot — Koff
non-washing washing
washing washing washing

87=

719 2 h

Conc Bromide Cadmium in H_2O
Soaked 3 hours 25 min — dried
Now Washing fresh KOH
Washing friday may

Iron mix used with Lead Cells

88 –

Req 5 gram Iron pocket

Soaked in 3/4 Concentrated $BaCl_2$
15 min soak dried then in KSO_4 –
washed H_2O –

89 – Req 5 gram Fe – Conc $BiCl_3$ NH_4Cl
15 min soak washed Conc NH_4Cl –
dried then KOH & wash

90 Req 5 gram Fe 1/2 strength Sol $BiCl_3$ NH_4Cl –
15 min soak washed NH_4Cl Conc – dried –
KOH + wash

91 Reg 5 gm Fe

in $SrCl_2$ - 20 mm soak
K_2SO_4

92 Reg 5 gm Fe
in $MgCl_2$ - 15 mm soak

93 - Reg Fe in Ferric Sulphate
its acid - 12 min - too acid
Zotty grid —

94 - Req 5 gm Fe
Ferrous Sulphate.

95 Req 5 gm Fe
Chromate K — soaked 12 min -
then $BaCl_2$ -

96 = Req Fe 5 gm
Cadmium Sulphate
then KOH -

97-

Reg 5 gms $PtCl_2$

dipped _____ in Conc $PtCl_2$
in CP acetone which has been
distilled from $PtCl_2$ & slight discolor
in 40 mm - not washed with
acetone - dried a little -
then - KOH -

98

7/19 2 hours

Soaked Conc $BiCl_3$ in Acetone
purified by distilling it with
$BiCl_3$ — it no longer decomposes —
Dry it naturally — don't use
heat as it decomposes
then KOH,
Now in KOH, all night.
Wash free KOH Saturday

99 = 5 gram Reg ½

Soaked 30 minutes in CP acetone
saturated with $BiCl_3$ – acetone
distilled with $BiCl_3$ —
Then ½ washed with $BiCl_3$ purified
acetone & dried natural temp
all night —

Dried on top of an open
evaporation all night —

XCP means
acetone purified by
distilling with
$BiCl_3$ anhydrous

See what was in tubes —

100

3 tubes Dup
No 3 flake — not eluted at 4
719 green —

Soaked 15 minutes in XCP
acetone (by distilling with $BiCl_3$) 4 —
$BiCl_3$ conc — Washed with
XCP acetone —
Dried all night on flask
over As_2O_5 —

101 –

Conc Aluminate K
Hot plate several hours
wash out —

~~Cyanide~~ 16.6 cc how
1 gram Bi

120 / 800 (6.6
720
800

800 cc —
110 @ 120 gm Bi metal —

100 cc

4 / 120
15

100 —

15 gms 100 cc —

102

Note below

719 2 hours Peroxidase Cy
Hypochlorite K — washed free
K — dried — soaked 1½ hours
Conc BiCl3 acetone XCP —
dried air — then KOH hot,
washed free —
~~Hot~~ Soaked all night standing
night in Hypo —

~~If a cool hot oxidize the acetone use BiCl3 KOH KCP~~

Product dark green

163 =

7/19 2 h

Soaked in KOH, with about 2 oz Tungstate Soda, soaked all night Sunday 7/18 — in morning heat, then washed out

104 – Edison 96
72 Reg 5 grains –

Soaked in Ferrous Sulphate.
then without drying put in 21%
K – washed well

105 =

7/9 2 hours

at 8 Reg Test 72 5 grms

Soaked together in 21% 2 grms LiOH

Hot — To be washed well

+ Run together

2 tubes 21 KOH — 6 76 —

~~2 " " 21 " 2 LiOH —~~

~~2 " " 21 " 12 " 2 LiOH~~

~~Precipitation~~ No tubes —

2 tubes 21 — 2 LiOH.

106 -

7/9 2 hours

In Conc Sol (slightly diluted) of Thorium Chloride - to a little acid —

Soaked - 2 hours - 1 quick wash

Dried all night natural Temp

KOH Hot & crushed Tuesday

107 This is part of 102
plain without $BiCl_3$ acetone

108 7/9 2 hours

Green put in Nitrate Bi quite acid, & then mechanically pounded fraccs + put in 33% KOH – but acid attacked green violently. Split up to fumes much all

Cold no heat used

Thoroughout process

109- 719 2 hour

Soaked 1/2 hour in Nitrate

Burnished Cone in Acetone

Put in 10% KOH after drying

No heat used throughout

process.

Product split up Kept

Req Regs

110 719 - 2 hrs

Put in Conc Nitrate Bismuth in Acetone - 1/2 hours drained then without drying put in 21% KOH - it split up to finer needles

111 719 2 hours
Heated in Conc Ammonia
Washed free of ammonia
only shade blue at 1st
finally white on hot
plate ~

112 708 Big Drum —
Heated with Conc Ammonia

Washed free of Ammonia

for 1st 2 or 3 hours on hot
plate Sol was blue but
finally became clear
Dno blue

Soaked all the tubes in 21% hot for several hours, then diluted to 10% & boiled for 1/2 hour then poured off & heated with H_2O & little KOH, twice hot plate. Then left all night in H_2O & little KOH, on asbestos in morning only a trace of Chlorides washed & sent up to Walter Archer in H_2O containing little KOH to keep from tarnishing —

The tubes are quite clean soaking in the Acetone sol caused some deposition of B_i where now Egg-oxed but very little — This process will do OK

It may be the amount of B_i is not enough but it is certainly as much if not more than 1/2 strength of the strongest solution in acetone we ever possibly could have made

see Next page

Acetone distilled from Zn Chloride has 9% of $BiCl_3$ — 6.25 metallic

The large lot of dipped tubes made Feby 17th 1908 is made from this sol

its been made over a week & is nearly ~~[illegible]~~ clear as water — showing no decomposition to speak of —

Soaked 1 hours short exam lying off & immersed & shine in distilled acetone for material & then dried on glass 1 ft above asbestos on hot plate all night —

Took another Tube in grid weighing
17.040 + soaked it in nothing
Solution used with the tubes
in preceding page soaked
8 minutes + then weighed it
after shaking off in few seconds
the outside liquid having
Evaporated off
it weighed 18 grams
therefore absorbed 1 gram
of CKO Solution
This cant give more than
100 milg of Bismuth —
probably medal loss 1½%
16 grams of A.4 —

Don't think it will do much
if it does very little Bismuth
will be reason
only be 7 or 8 cents per cell —

Dried tube
+ it went down to 163 milg absorbed
+ could still smell acetone
probably 60 milg metallic Bi
is what really goes in

if this works than the Bi
must be Catalytic —

Made new tubes 719 2 h
Reg

		wt
No	1	wt 16501
	2	14994
	3	16.469 —

Soaked No 3 ½ hour in ZnCl purified
acetone saturated $BiCl_3$
9% $BiCl_3$
weighed 17157 gain of
688 milgrammes —

after resoaking 4 hours + 45
minutes — weighs 17 255
a gain of 786 total,
or 98 milg from the longer
Soaking

Think 1 hour total soak
is quite sufficient —

another tube No 1

Soaked Continuously 5 hours
gained 759 mlg almost
Exactly what No 3 did —

about 75 mlg of $BiCl_3$ in each
tube — or
45 mlg Metallic Bismuth

or 14 grms $BiCl_3$ per A.H.

or 9 grams Metal —

50 Cells per lb metal
which at 200. 4 Cents Cell —

Experiments with disalcoy
Shellac in Melted Solvents

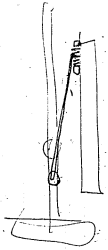
January 4 1909

Naphthalene works good makes
fairly thin liquid when in
contact with flow into a
revolving mandrel to mould by
spinning — for making paper tubes
of coating outside 1/16 of naphth
can be increased to get very
fluid — the surface when
poured on mandrel by hydrocarbon
solvent low temp of
mandrel ok.
After some time it probably
hydrolyzes out within the
body & its color changes
& it very tough & in thin
layers flexible — just
the thing —

This idea of disalcoy shellac
in a molten solvent & then
afterwards separates in the thin
film records which you through
for weaving — rough handling

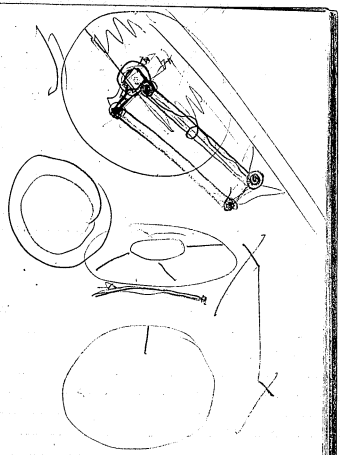
Camphor rout as good as Naphthalin, it stays soft & does not segregate —

~~The other~~ Phenylamine is curious makes the liquid solidifies soft but in time the phenylamine segregates & gumbles when in thin layers & the cullon becomes hard & tough —

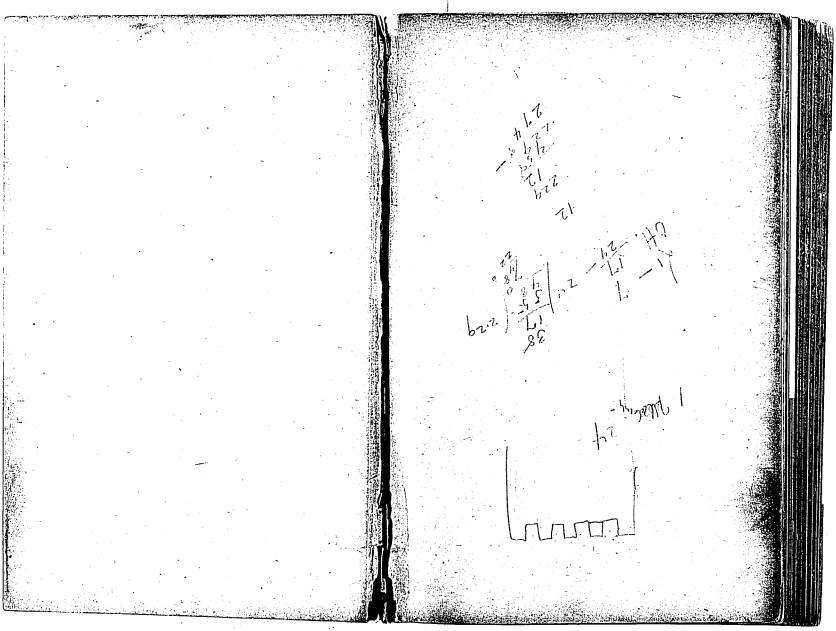


$SrSO_4$ - Kauf - Sol 10 000 pts H_2O
Ca fluor 1 Litre dis 14 mlg — K ÷ 26 000 H_2O
$BaCO_3$ Kauf - 64 000 H_2O
$CaCO_3$ " 99 000 "
$SrCO_3$ " 121 000 "

Barium Chromate 1 Litre 4 mlg Kauf — 86000 H_2O
Strontium " 800 pts distilled
Magnesium hydroxide Kauf 1 Litre 8 mlg from 55000.
Tech KOH —
Millons Base ?
Strontium Molybdate 9600 H_2O
Barium " 17000 "
Calcium "
Cadmium pyrophosphate mol KOH —
Lithium Orthophos 2500 pts H_2O
Magnesium Metal Orthophosphate mol H_2O
Strontium Orthophos "
Uranyl ortho Phos "
Manitate Mg Li Sr Zn "
Put Sulphur in pores by CS_2 5 dissolved therein
$BaSO_4$ Kauf 1 Litre 2 mlg equals 429 000 —
$PbSO_4$ 36000 pts H_2O
Meta Borate Magnesium } mol H_2O
Fluoride " }
Phos Ba (di) 2 mol H_2O
" Sr
Calcium Hydrox mol KOH — 50 000 parts



[THIS BOOK WAS USED IN BOTH DIRECTIONS.
THE FOLLOWING PAGES WERE FILMED FROM
THE BACK END FORWARD.]



I want you to work exclusively on Iron Tungsten mixtures so as to find out the best way of making the same so as to get the greatest output, economy & convenience

So far no precipitated oxides worked well even when reduced by Hy this refers to non alloys

You should try every kind of Iron & Tungsten salt, and combine them in various ways.

By precipitating together by igniting the oxalates together with the tungsten salts

By moistening ignited Fe_2O_3 with the salt of tungsten.

By fusing sulphate of iron with sodium sulphate until SO_3 practically disappears.

By heating the soluble matter
this oxide is the purest product
we so far have obtained & is
better than the ~~oxide~~ oxide
from oxalates.
The Fe Na sulphate oxyde can
be moistened with the
tungsten salt.

There may be some virtue in
the oxyde from fusing
ferrous potassium sulphate.

Also fusing other iron salts with
nitrates. Chlorides set to get
an iron oxyde in different systems
states

Also double salts of iron +
tungsten, iron Na + W.

Iron K + W fused + exhausted

Commercially we can no longer use Oxalates as Oxalic acid is too high & we shall use the Oxide from fusion of ferrous Sulphate, which is cheap process so as your Report states bear in mind that the value of the final result will depend upon how cheap it can be made

Or can pocket so far have an economy running from 40% efficiency up to 71%

and 440 milliamperes hours per gram of mixture including the 5% of HgO.

	Capacity	Ampere Efficiency	Watt Efficiency
Tu 80 Ri 20	1717	85.1	61.6

D.C.	Capacity	Ampere Efficiency	Watt Efficiency	
80 Tu 20 W	1710	87.6	64.7	5% H2O non hygroscopic
80 Tu 20 W	1481	68.4	49.6	5% H2O Self heated
Webb		— 0	—	
80 Tu 20 Su	2280	90.3	66.8	5% H2O non hygroscopic
-- -- --	1900	82.2	60.1	— — —
-- -- --	2005	66.3	—	5% H2O Self heated
Gleitz		— 0	—	
80 Tu 20 Sb	1781	76.9	54.4	5% H2O non hygroscopic
		— 0	—	
Regular	1415	76.6	55.8	Regular mixture
Berg				
80 Tu 20 Ri	1717	85.1	61.6	5% H2O non hygroscopic
Low OH				
From Tu 80 Su	1762	81.3	59.2	Self heated H2O Reg.

[ITEM FOUND IN BOOK]

50

50

B1

~~1275~~ - Wo-washed 1 gk Soak 5 min
1267 ~~1284~~

2 min soak washed 3 times 1275 - ~~1284~~
1 quick wash 1275
1/2 strength 1 1200
1/4 " 1210
1/8 - 1230

Soak 5 min no wash - L1 1200
10 " 1440
20 - 1340
Double soak 1250

Acc. R glycerol - Immediately L1 1230
" " 1250
" " Hypophosphite 1330

Pr Cl Hypo soak 10 min 2 gk (wo-washed)
wet gk Hypoglycerol Na 1380

25 Rem

Edison 22 Tone Nitrate Hypo 1350
24 - 25 min no wash 1450
23 wash Hypo 1500
29 1/2 strength wash Hypo 1380
27 - 1425
30 - 1375
33 - 1320

[ITEM FOUND IN BOOK]

25

Very E 40 — Combination

43 — no light. 1215 —

44 — no light. 1220 Sr Soy

45 — Northumb. — Beef — 1215 — no li

Notebook, N-07-01-28.1

This notebook covers the period January-May 1907. It was used by Edison and laboratory chemist Arthur H. Glaister to record notes regarding the preparation of iron-antimony compounds for storage battery experiments. Several entries note the involvement of Otto Groethe. At the beginning of the book are Edison's instructions to Glaister and what appears to be Glaister's transcription of other Edison instructions. The front cover is labeled "Not very Important." The pages are unnumbered. Approximately 90 pages have been used.

Only the entries listing the instructions for the experiments have been selected.

Glaister
Work on
Antimony
Iron
compounds.

William H. Hunt
... STATIONER ...
Good Work Promptly
68 William Street,
New York.

Standard figures

80% Fe 20% Sb

1781 capacity down to 1 volt.

76.9% ampere efficiency

54.4 watt efficiency

Regular mix

1415 capacity - 1 volt

76.6 ampere efficiency

55.8 watt efficiency

Jany 28 1907

Glansler

I want you to work on Iron Antimony Combinations —

Copy from Dr Grothes book what I say about Iron Salts & Oxides etc

Make 4 oz samples of dry mix Containing always 80% Iron and 20% Antimony —

This 4 oz of dry mix goes to Silver Lake to be reduced by Hydrogen —

½ of the samples will be reduced & self heated the other ½ will be reduced to the non pyrophoric state,

Two pockets of Each half will be made & tested and

the results given to you
so you can see the results,

Put down in this book clearly
+ plainly just how each
sample is made so that it
can without doubt be
exactly duplicated should
the results be good —

Hundreds of combinations can
be made by use of different
oils of Thor + Antimony —

Try every kind of Iron &
Antimony salt & combine them
in various ways.
By precipitating together by igniting
the oxalates together with the Antimony
salts
By moistening ignited Fe_2O_3 with
the salt of Antimony.
By fusing sulphate of Iron with
Potassium sulphate until the SO_3
practically disappears & exhausting
the soluble matter
This oxide is the purest finest
we so far have obtained & is
better than the Iron from oxalates
The Fe_2O_3 sulphate oxide can
then be moistened with the
~~Tartar emetic~~ Antimony salt
There may be some virtue in the
oxide from fusing Ferrous Potassium
sulphate
Also fusing other iron salts with
nitrates chlorides etc to get an Iron
oxide in different physical states
Also double salts of Iron Antimony
Iron Sodium & Antimony Iron Potassium
Antimony fused & exhausted

Commercially we can no longer use oxalates as oxalic acid is too high, we shall use the oxide from fusion of Ferrous Sodium Sulphate which is a cheap process.

You in your experiments bear in mind that the value of the final result will depend upon how cheap it can be made. Our iron pockets so far have an economy running from 40% Efficiency up to 71%
And 440 Milliampere hours per gram in 2 of mixture including the 5% of H_2O

You need make only 40 of dry materials ready to go into the hydrogen tube 30% Fe 20% Ti.
½ of the sample should be reduced in H_2 only heated 5% H_2O added
The other ½ is to be reduced to the non hydrophyric state & 5% H_2O added
2 pockets made for each sample — 5 grammes in each
I will have Thorpe & Whitehead send your results of tests to that

you can see if you are on the
right track.
Any chemicals you want
order through Mr Randolph.

Preliminary experiments

① Saw in Watts that Pb_2O_3 was soluble in a strong slightly acid solution of Fe_2Cl_6 and whether the same applied to the metal.
Made a strong solution of Fe_2Cl_6 & added a trace of HCl then digested with some powdered metallic Pb the metal was attacked readily & went into solution as $PbCl_2$ at the same time reducing the Fe_2Cl_6 to $FeCl_2$ this makes a nice way to get the metal into solution along with Fe or adding H_2O the PbOCl is thrown down in abundance.

② Took some of the Fe_2Cl_6 solution of Pb which was fairly saturated consequently mostly Fe^{II} poured into an excess of Na_2CO_3 solution thus precipitating $FeCO_3 + Pb_2(CO)_3$ warmed the beaker & introduced a stream of air to oxidise the Fe formed

the reaction to be too slow to be of use commercially

(3) Precipitated some more of the solution with Na_2CO_3 & started to filter as it was fairly good to filter but the pH continued considerable fire

(4) Gradually introduced the alloy Yb into a crucible of fused KNO_3 such the mixture of making $KYbO_3$ the Yb was attacked with violence cooled & dissolved out with water, found that there was a lot of Yb in solution as $KYbO_3$ but at the same time there was a lot precipitated probably as Yb_2O_3 or Yb_2O_5 added strong Na_2S solution to the clear portion got an abundant ppt of Na_3YbO_3 showing that the Yb was present in the form of a meta antimonate

(5) Mixed some of the $KYbO_3$ solution with an excess of a slightly acid solution of Fe_2Cl_6 then poured into an excess of Na_2CO_3

and brought to the boil filtered added HCl to the filtrate and passed H_2S no ppt showing that all the Pb had been carried down by the Fe as Ferric Antimonate $Fe_2(SbO_3)_6$

(5) Made another fusion of metallic Sb this time used a mixture of KNO_3 & K_2CO_3 there was still a good deal insoluble in water though less than with the KNO_3 alone

4 Dissolved some metallic Sb in strong HNO_3 washed the Sb_2O_5 by decantation & digested with a large excess of 33% KOH the precipitate in time all dissolved except a trace which looked like mostly Fe. this solution when mixed with HCl gave much more ppt than the previous solutions

(8) Found Sb bl. with enough HCl present to keep clear solution does not ppt with $K_4Fe(CN)_6$

Results obtained with Na_2CO_3
Ferrous sulphate + Antimony + Lead Iodide
Glauber No 1

Sp. Gr. Acid 5 grams
½ vol Iodine 1 vol ~~Iodine~~
885 1255 1280 865 1220 1045
1160 1500 1635 1100 1095 1140

Non Oxygen Force 5.5 grams
5.5 grams
½ vol ~~Iodine~~ 1 vol Iodine
875 1460 1850 860 960 1120
800 1620 2070 745 1080 1215

In efficiency

Preparation Glauber No 1

Took 792 grams of $FeSO_4$ crystals & 40 grams Sb metal this represents a proportion of 80 – 20
Dissolved the $FeSO_4$ in water ~~& oxydised with HNO_3 specg~~ cc added 70 cc conc. H_2SO_4 then heated to almost boiling & oxidised with HNO_3 it took about 200 cc then added 500 cc in excess making 250 cc in all then added the 40 grams of Sb in fine powder & kept hot on the steam bath with constant stirring it was very slow to dissolving added another 50 cc of ~~Sb~~ / ~~to~~ HNO_3 & another 20 of H_2SO_4 evaporated down to dryness & took up again with water there was still a little Sb left undissolved but let that go poured in an excess of a ~~hot~~ solution of Na_2CO_3 and washed by decantation 10 times filling the basin up

Notebook, N-07-01-28.2

This notebook contains dated entries from the periods January 1907, June 1907, June 1911, and August 1912. All entries are by Edison. At the beginning of the book are instructions by Edison to F. W. Weber regarding the preparation of iron-tin compounds for storage battery experiments (see also N-07-01-28.1). Most of the book contains notes pertaining to the production and duplication process for disc phonograph records. The front cover is labeled "Dr. Weber 1907." The pages are unnumbered. Approximately 100 pages have been used.

Jany 28 1907

Dr Webber —

Dear Dr Gruber Cook —

I want you to work on Iron Tin Mixture, 80 Iron 20 Tin —

Each sample should contain 4 oz of dry mixture ready to go to Silver Lake to be reduced & hydrogen

½ of the sample will be reduced & self heated & 5% HgO added
The other ½ will be reduced so as to be Non pyrophoric & 5% of HgO added —

Two test pockets of each kind will be made & self heated & non pyro
The results sent to you so

You can see what progress you are making -

Record everything in this book and number each batch

W No 1 W No 2 Etc.

Don't figure in this book but record clearly & plainly how each batch was made so it can be easily duplicated

These two pages have no connection with the following pages. G. Ott

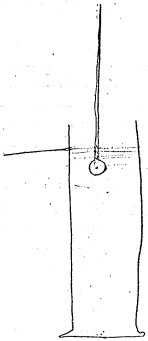
June 5 1907

Take a Solution of 21% KOH. ~~pot~~

dissolve 1 gram Aluminum to each 100 cc of KOH, —

Then take about 20 cc of the Solution. & boil with - the following fresh precipitates — to see if Can precipitate out the Al_2O_3

1 Nickel Hydroxide —
2 Ferric 2 " use plenty Hydroxide
3 Bismuth 2 " ~~use plenty~~
4 Manganous "
5 Manganic "
6 Antimonic "
7 Magnesium 2 "
8 Calcium "
9 Strontium " No Ppt.
10 Barium 2 "
11 Cadmium "
12 Copper "
13 Cobalt, "
14 Chromium 2 "



3% clay
5 "
8
10
15
20 %

Viscosity

D

Aug 17 1912
TOY

Experiments to produce a varnish on plates to transfer by heat & pressure to disc blanks — The trouble is air bubbles many microscopic these stay in + when in press under heat they Expand When cool print records + when relieved of pressure many of them Expand + throw up a small

2 pages over

June 28 1911 —

Varnish of Condensite on leaves —

50 grms Regina Shellac
70 cc Denatured alc —
in following % each batch
Horizontal —

1.6 2 2.4 2.8 3.2
3.6 4 4.4 4.8 5.2
5.6 - 6 —

Sections on veneer varnished & dried

Aug 17 1912 Taly

principle, this gives a crackle sound on record, so far we have tried about everything to eradicate these bubbles but so far have not succeeded,

We have poured the varnish on level plates with turned up edge but its very difficult to keep plate flat when centrifugalizing supposed to be at pressure hence varies in thickness In addition the liquid when put on all in one layer takes a long

Aug 17 1912
7648

time to dry — this ties up an enormous number of plates that it is absolutely — to prevent this we are compelled to use a brush & put it on in 12 layers drying each layer 1/2 hour to permit solvent to nearly evaporate. It is the brush action which intangles microscopic bubbles in the lacquer — the rapid passage of the brush causes a vacuum to be formed at each end of brush microscopic in size & some quite large —

The lacquer is thick & poured on plate to equal after drying the thickness of 12 layers immediately forms a film on the surface & impedes strongly any

Aug 17 1912
7 28

further drying of the Solvent,

There seems but 2 ways out of the dilemma —

1st put it on in say 12 layers get something as a substitute for a brush that will not produce air Bubbles + also have the same action as a brush so that it will not be necessary for the plate to be flat all over —

Or put it on in one layer + have plate reasonably flat and Evaporate the Bellsol so there is no surface film formed

Experiments just tried show that if the surface

Aug 17 1912
TAE

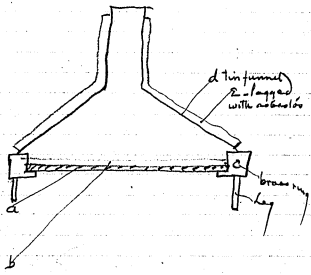
is kept overcoated with an atmosphere saturated with the solvent and kept at a temperature 20 or 30 deg Fahr below the boiling point of the solvent no film is formed & the whole of the solvent can be evaporated out without producing blisters or bubbles due to solvent

On pouring the is no bubbles formed as a rule & if there are they are of such a size as to be visible & can be taken by flat tweezers before baking

We are making this preliminary expts shows that it will probably work

Aug 17 1912
TAE

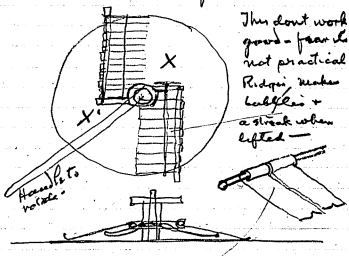
L



a — transfer plate
b varnish — whole is level, + poured at
ozcc 80 cc — about
The whole put in oven & if Adelthal
is used kept at temp 120
at first, then 140, for several

Aug 17 1912
TAE

hours, then raised gradually to 225 — This bearings can be used for submarines —
If Commercial record veiwer after is used —
Can put the lacquer on thows



Tin or brass, Loose slips of proper weight The whale

Aug 17 1912 TWB

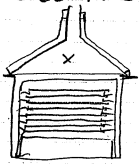
device can be lifted away from the plate. This device acts as a brush but instead of dipping the brush in the lacquer the proper amount is poured on plate at X X' & these rotating leafs used as a spreader the viscosity of the solution is such that the weight of the leafs does not sink far in the lacquer it merely spreads it uniformly After the 1st spread it is air dried & then another dose is poured on & spread until the

Aug 17 1912

TAE

proper number of layers is obtained after final drying the lab. net although on which does not flow when subjected to low heat

A crate holding 20 plates is put in a closed box & covered thus

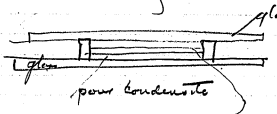


a large number are put in an oven & brought up to over 120 fahr for several hours the solvent vapor soften the films & the inner part of box & funnel is in a warm saturated atmosphere

Aug 17 1912
103

of the solvent which gradually disappears up the chimney of the funnel - After the solvent is evap the heat is gradually run up to the boiling pt of solvent used there for couple hours & then in 2 hours heat to 225 - fahr to harden the condensate varnish

While the apparatus is being made in substantial manner I try this

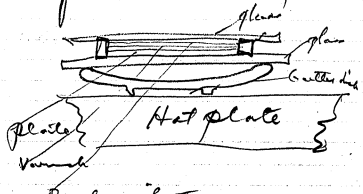


Layer of paraffine oil
another with - amyl alcohol

Aug 17 1912

over it – another with glycerin over it – idea being alcohol will dissolve in the dry glycerin or paraffin oil & keep film from forming & that of inches thickness can be obtained without formation bubbles —

The remaining liquid may be poured off & a layer of wet it can be quite thick & discarded the contents surface of plate can be washed free of the top liquids



Paraffin oil —

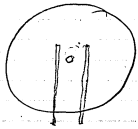
Aug 17 1912

74.

We have been trying a lot of Expts on gold plating Double Measures of Condensite sub-Measures in Vacuum to get an Even Coating — also Expts to Evenly deposit Copper from Electrolytic Copper Bath, Evenly full over

To get even deposit of gold it is necessary to rotate the disc in Vacuo by a magnet outside rotating & dragging disc along with it —

The present way of using 2 gold strips, arranged thus —



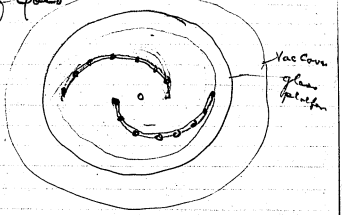
is unsatisfactory as the amount

Aug 17 1925

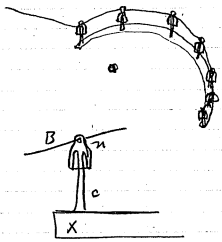
of gold strip to the area to be plated is not taken into account hence the deposit is heavy on inside or Center & very thin on outer surface - hence when we attempt to Coat the whole disc with Copper by Electro plating the resistance of the gold film being thin on outer surface & reversible the deposit is very slow & uneven - this tends to make a bad record surface growing surface nowise. The bad spots are finally covered by it as covered by creeping of the deposit but doubtful as it would be if the gold was sufficiently thin to conduct

Aug 17 1912

We use gold wires instead of sheets so as to raise the temperature by decreasing the surface causing the gold to distribute more evenly so that heat up the apparatus or wax disc which is dangerous & we so arrange the total length of the wire that each square inch of the white wax receives from the same length of gold wire under it & get the same or as near as possible the same amount of gold



Aug 17 1912
7 AM



X the S shapped glass rod -
C uprights with an end like an
ordinary telegraph wire
insulator the gold wire
being suspended from
these uprights — the

Aug 17 1912

object of the glass
insulation is to prevent
Electric contact with
the gold surface formed on
the upright glass S.
which at a certain stage of
the deposit helps to carry
the current instead of
following the gold wire
this reduces the temp
down heats up vessel
+ produces gold deposit

The insulation inside gets
no deposit hence it breaks
connection between the deposit
formed on glass + the
gold wire

The peculiar shape of the
position of the gold wire
is such that the length
of wire exposed + valuation
gold is the same per
square inch of area of

Aug 17 1923

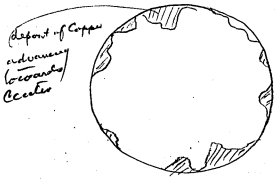
The wax disc —

After each operation the uprights, & other parts which have used a deposit is cleaned by Cyanide or aqua Regia & used again

The film of gold on the white wax is very fraible, a soft brush moved over it once removed it free of the wax hence the method of taking out the white gold coated in water putting it in a special holder & winding wire around the edge

Aug 17 1912
TAE

is a very defective operation as the wire breaks the gold film & makes contact only in places — When we coat with Copper it appears thus as the deposit advances



By cutting a groove on side of wafer we yield record thus

& winding No 36 Copper wire in the grooves several layers

Aug 17 1912
709

Before it goes in Vac the gold is deposited over these wires –

then when Wax is put in Spider, an additional few turns of 36 wire is wound over the wires in the groove + connected to the pole on the Spider. The Copper advances Evenly over the Edge + proceeds to the Center something there are slight defects in the plating of the gold. and the copper does not deposit at first on this spot Making an Island so to speak = also it is best

that the copper should advance quickly towards the Center; while also should be covered quickly as the Electrolytic bath tends to attack the Wax then minute holes in the gold film

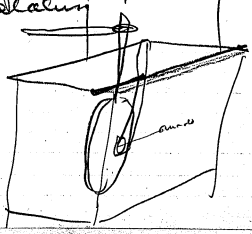
Aug 14 1912
724

to all aim this circuit.

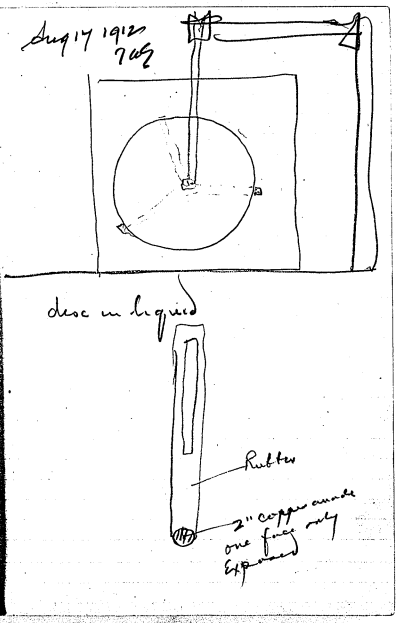
I use with a 10 inch disc

an anode on 2 inches in diameter & place it about 2 inches away from the center of the wax model at first & as the copper advances towards the center I put it closer sometimes 1/2 inch —

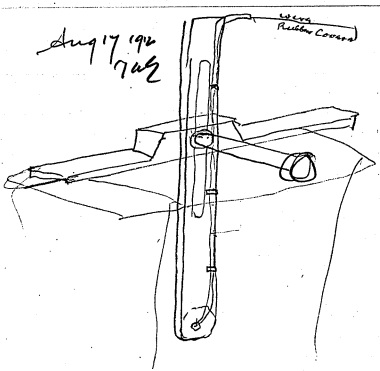
This anode is movable & can be manipulated by the operator superposing the platinum



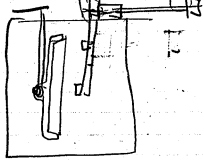
Aug 17 1912
7 a.m.



Aug 17 1912
7 AZ



Anode movable in every direction in front of the disc



Aug 17 1912

With this anode of a spot dout plate he moves the anode directly in front of it enormously increasing the Current density & quickly Coats it thus preventing any action of the solution.

After the wax master is Entirely Coated with the very thin layer of Copper it is transferred to the regular bath & rotated with a high density Current until the copper is about 40/1000 thick & then the wax shrunk from the mounting Edges cut away & mounted on a brass backing

We have tried platinum with gold but the Rho is rough & its not so good

Aug 17 1912
TAE

One of the principal objects of having a small anode is to prevent plating too much Copper around Edges & to advance the Cop Coating towards Center as fast as possible —

We use 1 amp at first & when in about 1/2 to 3/4 inch use 1 1/2 amp & then when uncovered part is 4. to 4 1/2 inch then use 2 amperes.

We use 10 to 18 amp in big bath for making the thick deposits —

Aug 17 1912 704

The varnish in 2 ½ dia ring covered with paraffin oil & set on butter dish right on hot plate - was fully set & baked in 2 hours it had few bubbles but this is due to rapid baking at higher temp than BP of the alcohol its remarkably good—

This Expt shows that the alcohol goes into the oil & escapes from oil keeping surface of varnish free of the vaporous film

This is a fine Expt & we can use it

Aug 17 1912 Tag

The varnish in ring
Covered with amyl
alcohol was Gone on
2 hours is free of bubbles

Think it too soft yet -
tried it - to solid but too
soft = Think amyl alcohol
dissolves in it

Glycerine is no - whitens
Varnish - muddy -

Amyl alcohol sol in Ethyl al

BP 263 - so it can be mixed
with Varnish & it could stay
until all the Ethyl is
off & Varnish hardened
then it Cambes Coat up
& all the amyl driven off -

It seems strange that amyl
al is the only substance

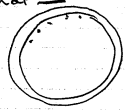
Aug 17 1912 7 AM

that prevents frothing of Liquids when gas is generated & that it also prevents bubbles in Condensate Vacuum — ? ? —

As to Expensive the question is now what is the cheapest quantity that we can use —

Am trying Castor Oil film over the liquid Vacuum

it seems to run over it — when hot —



put it in hot place bubbles are coming out at Edges but not in general surface

Aug 17 1912 Thy

Castor oil dont work good - Wants a thinner substance like Kerosene Pratts Cutting Oil probably —

3500 cc water —
100 cc of a 15% Solution of Kcy + 50 cc 4% Sol Hydrogen Perox dissolves gold from Vacuum gold depositing apparatus quite quick —
DIE immerse the

Aug 17 1912 7a.m.

Whole of lens apparatus in liquid in few minutes gold is entirely dissolved. We wash them in hydrant water thoroughly & then in distilled water & dry -

This solution will not keep as Key Oxidizes to Cyanate - If there are several ready to be cleaned think it will clean 4 or 5

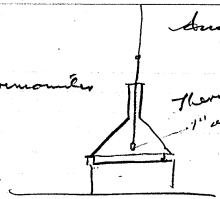
Aug 17 1912 WM

till it gets too slow —
It can then be thrown
away — after a while
we will pour it
from Zinc shavings
& save the Gel. —

The poured plate in ring
with funnel over it
lagged with asbestos.
had 80cc of No 7 Varnish
poured on it at 2.50 pm
at 730 it was soft but
color getting deeper dont
smell as much alcohol
smell phenol stronger
Have kept heat just over
the film 120. @ 140 limit

Aug 17 1912

Thermometer



No bubbles have yet appeared
I am raising the temp to
140 already — 9/10 of time
been at 120 @ 120°

That smelling any more alcohol
or the film titled soft makes
me believe we should have
a little more G/4 & it would
have hardened at 140
Speak to Arlew to make a
bottle of No 8 Varnish
which is 107 with little
more G/4 —
I believe the alcohol is all
Evap & now we have to
go higher to get hard
whereas if more G/4 it
would be already hard

Hoffman –

Makes Varnish.

Brooklyn

Aug 17 1912 Tue

After 5 hours it is probable that the film in funnel apparatus would remain soft for all time – I think its in a condition to harden + has been for 2 hours – its been on 6 hours – I am gradually raising temp to 150 to see if it will harden any – I probably safe to go to 160 ~~Hardened~~ but will keep it near 150 for a while 9 pm to 142.

920 147 Fahr

945 152 Fahr – flowed to one end

952 154 "

10 PM – 156 "

1009 158 "

1047 160 "

1112 160 "

1120 160 " I find it red + hardened

bubbles at edges – fin on side full bubbles 3 or 4 bubbles 1/4 away in back part look unpractical / unpractical

Cant stick pencil in it It hardens in 2 hours – after its been around 140 + gradually raised to 160.

No bubbles can be seen —

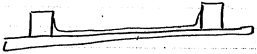
This is 5 hours at 125° Fahr

30 minutes at 140 deg
15 " at 154
1 hour at 160 — hard,

probably not hardened enough for transfer, therefore it could be brought up to 225°, in 3 hours more, making the whole process 12 hours

As against 6 hours lacquering + air drying or 22 hours in oven + full of bubbles —

In the spot with small rings the varnish runs up on the sides — which is very bad this



I now grease the inside of the

ring with heavy & raw fine oil
so that we need [illegible] lubricate
bearing + it looks as if it
was going to stop it

We are now setting up a
varnishing table so I feel sure
the speed of the table is
altogether too high when
160 revs 180 - I think
it should be 6 or 8 per
minute The high speed I
think makes bubbles as
vacuum formed behind the ends of
the brush bristles or hairs -
also the varnish is viscous
& it pulls it along lapping
over varnish previously
put on ground great chances
to trap air + make bubbles
I found this so with the
little tin flaps

Up all night Aug 18 1912
6 am — TKE

Varnishing transfer plates without bubbles is certainly a tough proposition
Every scheme so far has failed. Brushes, feed boxes fountain pen principle, scrapers etc. no — Nothing Could, with perfectly flat plates dead level, some of the schemes work but to costly impossible to handle many thousand plates subject them to pressures of 1100 Ton + keep them flat —

We are now trying flowing the same as the old style photopaper flowed the collodion emulsion over the glass negative, by hand manipulation —

To make this work out all had to add to

Aug 18 1912 7 cy

No 7. Varnish sal 50%
more alcohol,
With 25 cc of this each time it can be flowed nicely = The first coat is hardest to flow as it dont wet plated good but careful manipulation + drawing a splint over an iolcing thread dont cover it gets nice coat The 2nd coat is much easier - and 20 cc will probably work ok = It one of the little cup full within 1/16 of rim — I measure it by using from a cc measure

On account of excess of alcohol film dries white but if fumed when dried over hot plate at 125 F film it becomes transparent again

Aug 18 1912 TWN

It's probably the water in the Alcohol when boiler mostly evaporates it leaves a great excess of water + this precipitate resin —

I have just given first coat to 6 plates + put them in Aikens holder

have them over hot plate to dry 1/2 hour when I will give them a 2nd coat

I find 2nd coat can be done with 20 cc

think possibly can be done with 15 cc

Later it can be done on 2nd coat with 15 cc

Aug 18 1912 TM

but I think 20cc which works fine & Easy will be OK & it will only take 6 @ 8 or less layers to get 12/1000 when hardened

It is quite necessary that Each coat should be dried Enough so it is not soft under film as in manipulating the fresh varnish by anything the plate the previous coats are liable to flow. this must not take place think 1/2 hour at 125 with plenty draught will do the trick between Each layer — there is no hurry 3/3 3

Our main trouble now is the removable Edge around the plate as we cannot transfer in

Aug 15 1912 Tuesday

a non flowing mould with a transfer plate having a metallic raised Edge,

Neither can we use a Condensator transfer with a fin —

We propose making a removeable raised Edge & prevent leakage by a rubber tube, & when this Edge or rather the plate of Vermuch is removed the fin is to be filed off — this makes a rough Edge but as this is underneath it will do

no harm,

5 Hours sleep

Aug 18 1912

Find that the plate unmarked by flowing that was left at 9 30 this morning was dry on top but still soft, to wit the air - 5" above hot plate with indication on hot plate

This shows that when alcohol acts upon the phenol keeps it soft but its in good condition to flow more & open. — ½ hour at 120 is sufficient & chunk to dry film

sufficient to flow OK the other Coals —

I found that our No 7 varnish has quite a lot of fine specs which glisten on the plate when spread. It is possible these specs decompose at high temperatures & give gas, fortunately in detaining the resin to get it to flow, we have got it thin enough to filter thru filter paper which

We are now doing.=

Thinking that the 5% water in the alcohol which is left behind after alcohol is evaporated produced bubbles when the temp got to 160 & above

We got a gallon of Absolute Ethyl alcohol & attempted to make varnish with it instead of 95% denatured & found that the 6/4 hardner will not dissolve in it so we are up a stump & will have to distill the water However I am certain we can use 97% which will help some

We have found that in pouring on plate & manipulating to get it flowed over Even that a few bubbles now & then gets in mechanically

We have found that this tool placed over the bubble in the varnish immediately after its flowed a before film formed will remove the bubble

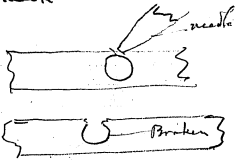
1/8 hole - on suddenly lifting the viscosity of varnish is such that a portion with bubble is lifted & bubble bursts the varnish on plates quickly fills the hole! -

We also find that the hardened varnish has bubbles Even the best wile have 20 to 50 which is hope to get rid of altogether but cut all cutter transfers We have a girl go over the plates + open them then on pressing at high temp 320 to put transfer on blank The condensated flows into the

holes leaving only a circle very faint where the cuticle excluded & the decreases does not give out a sound when passing over

We use a needle with end ground to knife edge by pressing & turning the wall of the cuticle is broken

The deep ones will require rotation of the needle



boiling ~~Alcohol~~ Acetone Benzol dissolve scarcely any 6/4 ditto Amyl Alcohol

but boiling Absolute Alcohol

100% dissolves very considerable

Probably enough for our work as the use of excess of alcohol —

Further hot Carbolic acid also dissolves some 6/4 — which is in our favor —

50% of Alcohol added to Reg No 7 Warmish, filter nicely — but towards end filter paper gets closed

About 8" dia of filter paper is OK for 250 cc of liquid — without getting slow —

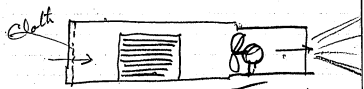
There is an enormous amount of dust in No 7 as shown in a hardened transfer 25/1000 thick

Under Microscope where there was only 2 flows — but undoubtedly a large amount of this collected in the room while 1st & 2nd Coats were drying —

These transfers while drying must be protected from dirt in almost by using Linen Conditioning or filter Chambers — keeping room from dirt as in Philpotts dipping room —

We have rigged up to flow plates — let dope run from a closed reservoir into a measuring cup

which seems to be the most practical way
pour it out on plate
& manipulate –
Took one of Aikens
perforated holders
& flowed 12 put them
all in the holder &
then put them in a box
thus



Later 3 or 4 hours in they are still white thus behave N.G.
They were in some 1 hour

Other 1/2 hour all were white —

Took one that has been in hour & put a 2nd flow on it, noticed that it became bright opposite every hole on the holding plate also that the surface of the white dope had sunk or raised can't say which opposite each hole — this is funny

It looks as if this device is a good drier — and that the open air may be better, I noticed two I made & put in open air after being white turned transparent & probably within a hour although not certain of time

We flowed plate with No 7
made with Absolute Ethyl
+ diluted 50% added also
of absol Ethyl, It seems
dry quicker as I had
difficulty in flowing
20 cc — Dried in air
it only shows a little
white at Edges

all the balance keep
clear — its very transparent

seems to act a little diffant
We flow another place
spread it under Bell jar -
with 4 dishes filled
with Strong H_2SO_4 to
absorb the alcohol
to form Sulphovinic
acid & also the water
it dont turn white -

flowing a plate with
20 @ 22 cc of NO7 dil with
50% Alcohol, first turns
white then in 2 hours &
10 minutes is transparent

and ready to flow 2nd Coat
2½ hours would go better.
It was out in the air —
of room - no wind —

Think they will have to be
dried in levelled racks in
large room —

Tried adding lot of water 15
80% as the alcohol I used
to dilute 50% — Sol clear
but on flowing it turns
white + Resin clots

It's the rapid evap of the ~~Resin~~ Alcohol & rapid increase in proportion of the water that makes it turn white.

We flow 3 plates with 20 @ 22 cc of NOY with 50% absolute Eq. Alcohol put them 6" above steam plate. Thermometer stuck in Center hole of one of the plates shows 115 @ 120

degrees — 45 minutes
was sufficient to
permit 2nd flow without
dissolving 1st layer —

45 minutes after we
made the third flow —
They look very nice
very pronounced bubbles
Ulopic took off with
glass point
Absolute Ethyl not denatured
is clearer only slight
yellow tinge on 3rd Coat

Think 1 hour over hot plate or with hot air at 115 @ 120, that as many coats as desirable can be put on plates

We flowed a plate & placed it in front of a blower on table fan in 5 minutes it turned white in a few minutes more turned transparent again - this shows

Dickens oven

4 hours	120	Fahr
4 "	140	
6 "	160	
2 "	200	
4 "	220	

rapid drying at ordinary temp. –

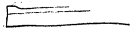
I found by using 20% diluted with equal quantity of Alcohol that the layer is much thinner with 20 cc, and that it dries hard. This gives us another chance to solve the problem but at considerable expense for alcohol

It would reduce the bubbles to a small dimension. as the liquid comes limpid there will be less formed,

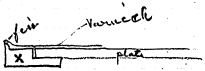
Last night the 3 plates that were given 5 coats & dried 40 minutes 6" over hot plate. We made the mistake of bringing them hot from the plate to flow them — We should have set them on a chilling plate to cool Gelco atmosphere then the whole gets much harder — the new varnish will not attack or soften the old varnish —

We gave the 3 plates with 5 coats to Arthur man to bake as per schedule on last page also one of Moores plates for Grumman There is a fin on it

fin —



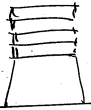
Here is a new scheme to stop the fin —



As the hammock is soft before final bake the plate is forced

out of ring X, leaving the fin on ring — Then when baked there is no fin — Moore making it —

1st Recipe. Absolute alcohol diluted Denatured



Hot plates on 2 hours 1st Coat should have been 1 hour 2nd Coat on 5 & 3 — Thin coat wood alcohol diluted Denatured — 3rd Coat 6 & 0 on, 6 plates —

I note that the varn made with 95% wood alcohol is much thinner than with Denatured — I added the excess of 50% of Denatured — I do not doubt but that if it was diluted with wood alcohol instead Denatured it would be thinner yet — It filtered fast

I will make up a batch of 707 wood alcohol & Dilute it with wood alcohol, think I can use 15 @ 18cc at time instead of 20 @ 22cc & thus get better results drying — Especially as wood alcohol has lower boiling point — & I can get it absolute for few cents more gallon — & it has no dissolving unknown substance in it which possibly gives trouble —

Bad flow on the 6 plates dont decide the previous coats except in one case where it was thicker on one side plate not having even level

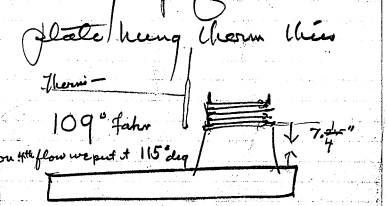
40 minutes at a point over hot place where Therm shows 115 @ 120 is ok for the work

The one with wood alcohol when baked is deep red whole trial from Denatured is light red —

with wood alcohol in 107 & Denatured for 50% dilution

The next batch we will try 30 min & all wood al 107 filled —

to actually see what the temp of the air is coming up from steam plate hung therm thus



plates are 9/16 apart

bare plate on Top — 6 flows plate —

5th & last coat on — practically there is no dissolving of the previous coats, if 50 min a certainly 1 hour with air at 115 @ 120, the coats will be dry enough so now attack on previous film or flow of same underneath if Operator is expert in covering & liquid is proper thinness —

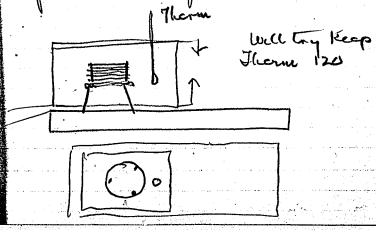
We will have Aiken Load these in Oven tomorrow for regular baking

The plates look very nice

Aug 19 1912 TAE

We now use 107 Varnish made with 95% Wood Alcohol 50% additional of Wood Alcohol whole filtered,

Varnish & plates flows fine, 22 C 2d Varnish Coat,



An extra plated flowed & left on bench quickly turned white

think we can dry in 30 mins: but allow 35 the extra 5 for chilling when we left box on after flowing — 22 @ 23 cc used each time — We cool off before flowing It covers without affecting previous film —

Notice this lot at 35 with box around & 120 dont dry as quick as the other lot in the open & 115 deg in 40 minutes —

Think good circulation of warm air in the Oven is best = 40 minutes is about right When 6 are in Crate & 3 washers apart & blank on top —

We have just made another Crate using 22@23 cc all wood alcohol 50% additional — & will leave it on table, no heat Room temp 76 Fahr

Tried Expt using undiluted
#07 - + using enough
of following to make it
flow good 23 cc

Camphor oil NG exp out

Gasolene Dont mix

Carb Tetrachl - No advantage

Sassafras oil. NG —

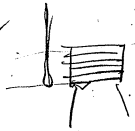
Benzol, works OK —
Could use this to dilute in
place of alcohol if
any advantage —
I can see none as far as
gone —

The 6 plates in box Dryer
Hot plate just finished
flowing 5th & last flow.
Last two is little soft &
show signs of wrinkling as
I angle the plates to pour
This shows that 35 min
is not enough —
To make it perfect, it
should be in 1 hour
In open box instead of
the hot plate, then the
flowing will be
perfect,

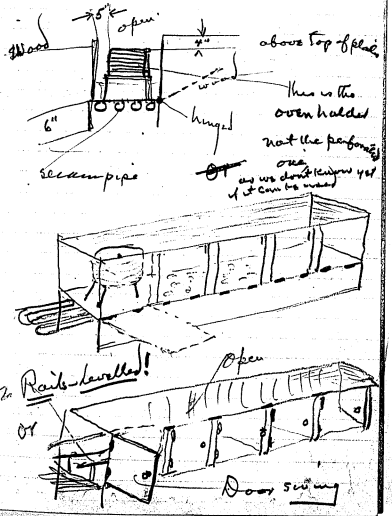
Thermometer

should show 120

hung thus



Acker Cooking up this



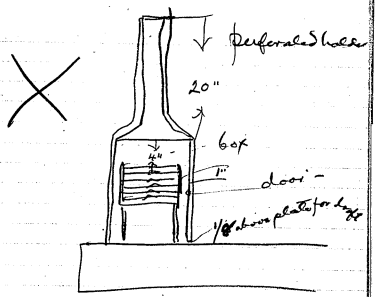
A Crate of plates with 5 plates 4 ft away from a Elec fan blowing thru is after $1\frac{3}{4}$ hours still mostly white, showing clearly that the plates themselves must be warmed as well as have a draft of warm air to stop chilling due to Evaporation,

I have been supposing all along that I might be using 20 @ 72 CC I now find that I use 20 cc & never more some time less for each flow —

Either Denatured or wood alcohol may be used dont see much difference if there are any the all wood 95% is the best as it appears to be a better Solvent, Thinner & flows well,

We now try drying over
oven at 120° - with 9
plates in the perforated
Holder - set over hot
plate - flowed with
20cc of NG 50% Ex Alcohol
40 minutes drying -
This is NG = Only bottom
gets warm takes hour 1/2
before white disappears
Am making a box

Thus



You go to cut out every other plate — & cut away some of the remaining plates

The 5 Coat 20cc Dilute No 7

on Grenes plate in ring &
forced out leaving no film

Was baked at 120 130 150 160
& finally rather rapidly to 220
had 2 large bubbles 1/16 dia
broken — You could see the
plate. There were about 10 other
small bubbles the tops appearing
above general level running
finger over broke the exceedingly
thin shell & apparently it dropt
to bottom —

We had the therm 1/2 above
the varnish suspended in the
funnel over iron plate on
sand bath, the bottom of
transfer plate being 3 1/2 inch
from iron plate on sand
& surrounded with Tin
ring lagged with asbestos

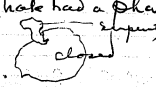
Possible the plate got heated very much higher than Therm showed as there was a draft between funnel & plate

This should be attended to next time & therm put in contact with plate underneath –

~~also~~ We had this Transferred to Sub-marine – One of the large holes is entirely closed except a fount dust ring

This will make no sound

The other hole had a shorted serpent.



Evidently the Cementing
Varnish squirted thru and
made the pharoah Serpent,

Aug 20 1912

Nicolai Cut out Each alternate
perforated plate in plate
holder also Cut out
some of Each plate

We can put 10 plates in
now & we have just
made the fence flow

Note ? ? Note

Dehydrated Resin
Dehydrated higher
than Reg — When diluted
with 50% more denaturant
is very light not seed
& it filters Very VERY Slow
totally unlike Regular
Later — When I use Wood alcohol
to dilute, it follows OK, & fast.

There is some cork got into
Varnish from Cork bottle —
We abandon Cork & hereafter
use glass — No more
Cork to be used in factory
for handling Varnishes
The Oven over hot plate
is disassembled & leaf back
Fred Ott is filtering the Varnish
over again & putting it
in glass stopper bottle
We are going to try &
Keep them at 120 & bake
40 minutes, taking out

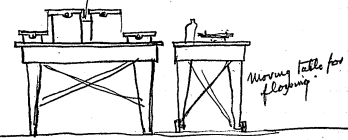
Crater & cooling before flowing varnish —

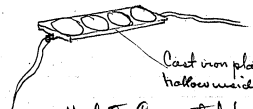
The perforated Crater are not level & I cannot see that it will be practicable to ever make & keep them level = The box scheme dont work even — bottom plates too hot condensate forms red opal. rosettes — Heat too sudden It dont look practical —

We have measured the thickness of one flow after its dried hard & have no softness to finger it about 3 @ 3 1/2 millimetres,

Think 3 flows is ok for Conical blanks —

New House





all plates connected together with warm water circulation if necessary, at 110 more or less. All plates level,

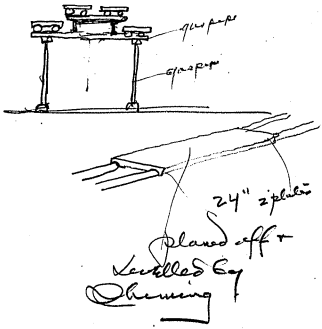
1 Man flows 100 hour – 3 flows.

3 hours, makes 300 completed plates in 10 hours – or 150. Records

This requires table to hold 100 plates, 4 plates to foot makes table 25 ft long 4½ ft wide – with 6 ft ~~Dish~~ 10½ ft Centers. Can flow night & day so each table gets 300 Records daily 20 hours –

for 3000 daily 10 tables required

½ of width of building & 100 ft long

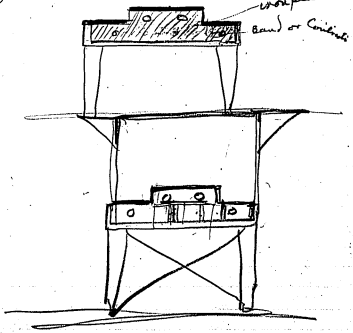


Hot water 100@110 –

We find that with 20 cc flow and steam plate 100 Fahr no white forms and that in 20 minutes it can be flowed on 3rd flow there is a slight streak showing film underneath

was slightly affected —
25 minutes it would be
perfect —

Here is a simple heating
plate -



plates dried on Eleven plates at 115 deg all right in 20 min

Except those plates that are not flat then 20 min is too short the film is dissolved by the 4th pour

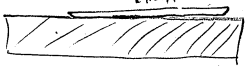
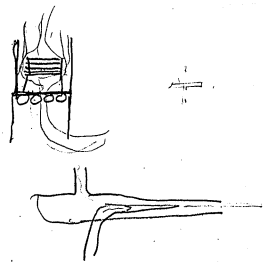
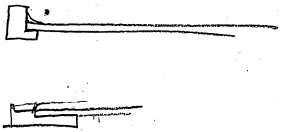
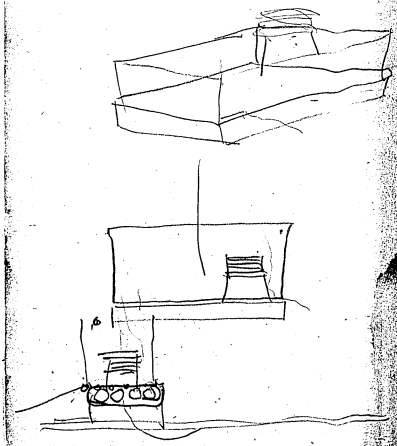


plate doesn't lay flat except one half —

To Obviate this defect 30 minutes will be required to make sure







57 | 446 lb
446

8 grams / Cent

80 -

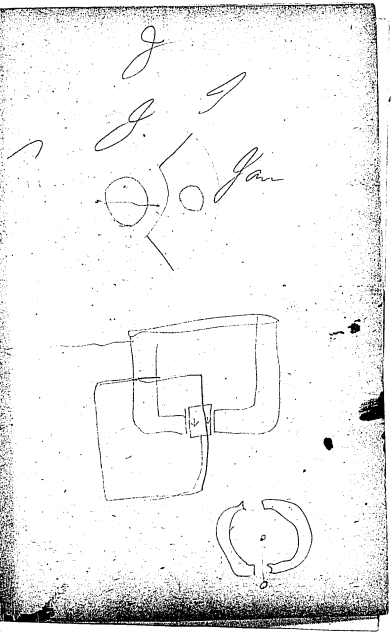
.40/o .57c

.7 | 4.00 -
57

Notebook, N-07-01-28.3

The only dated entry in this notebook is from January 1907. At the beginning of the book are instructions by Edison to Ludwig F. Ott regarding the preparation of iron oxide compounds for storage battery experiments (see also N-07-01-28.2). Most of the book contains notes by Ott pertaining to the preparation of the various compounds. Near the end of the book are 2 pages of instructions apparently from Edison and transcribed by Ott. The front cover is labeled "Important." The pages are unnumbered. Approximately 40 pages have been used.

The log of the various compounds prepared by Ott has not been selected.



William H. Hase's
. . . STATIONER . . .
Good Work Promptly
68 WILLIAM STREET,
NEW YORK.

Jany 28 1907

Louis Ott -

You are to work on Iron Oxide to beat quality —

Precipitated iron oxide is not good except it precipitates crystalline & dries as a powder -

Iron oxide precipitated by molten salts probably is OK as it seems as if it was essential to have the oxide anhydrous + powdery -

See Dr Grothes book & copy what I say in this book -

Make all samples so there will be 4 oz (about) dry that goes to Silver Lake to be reduced by Hydrogen

½ of the sample is reduced & self heated

The other ½ is reduced so the non pyrophoric

Both samples must have 5% of Hg O

added —

You are to use the auto & take Everybodys samples to Silver Lake — See that they are all plainly marked

For Each combination you make Enter the details Clearly & plainly in this book so if it turns out ok we can with Certainty duplicate them,

Walter will take charge of them 2 test packets

are to be made for each half
5 grains each pocket,
Hooper & Holland will send
down results as fast as
they get them —

You better make your fusions
in Cast iron pots —

Ralph fuses ferrous sodium
sulphate until scarcely
any more sulphurous acid
gas comes off & then
exhausts the whole with
water until free from
sulphate,

You might try mixtures in right proportions to form a double salt Even if no double salt is formed of

Ferric Sodium Sulphate
Ferrous Potassium "
Ferric " "

Ferrous Sulphate & Nitrate Soda
Ferric " " "
" " & Borate Soda
Ferrous " & "
& so on using alkaline salts that will fuse in non part,

You could also use Ferrous Sulphate & KOH Solid in Excess

Think you should recrystalize your Iron Salts,

Chloride Calcium
" Zinc
& other chlorides might

possibly act as flux to decompose Ferrous Sulphate

You Could use different fluxes like Sulphate Soda & instead of Ferrous Sulphate Use Ferrous Nitrate, acetate, which decompose by heat,

Carbonate Soda & K good fluxes —

Possibly the reason Fe_2O_3 from Ferrous Na Sulphate work better than Reg is that it is very much finer —

If this is so & that fineness is what is wanted You Could fuse the Ferrous Na Sulphate with some salt that would leave a fine precipitate mixed with the iron say twice as much

of the precipitate as there was
iron oxide & then dissolve
out this fine stuff by some
solvent leaving the iron
extremely finely divided —

Oxalate Fe can't be used as price of
Oxalic acid has more than
doubled in last 6 months —

In making Ferrous Sulphate
look out don't get any Ferric
Hydroxide in the mix as Hydroxide
don't work in Gettering Even of
reduced Cryst —

Might try Melted Sulphide of
iron & put in powdered Ferrous
Sulphate heated so water
driven off - also Ferric Sulphate
water of Cryst driven off —
Then there will be a reaction
forming Sulphite K or Na & FeS
finely divided - Exhaust

with water until no S
or Sulphate Na left
then roast at gentle heat
till all S driven off —

I want you to work exclusively on Iron Tungsten mixtures so as to find out the best way of making the same so as to get the greatest output accuracy and consistency. So far no precipitated oxide has worked well even when reduced by H. this refer to yourselves

You should try every kind of iron and tungsten salt and combine them in various ways

By precipitating together & igniting the oxalates together with the Tungsten salts.

By mixing equal Fe_2O_3 with the salt of tungsten.

By fusing sulphate of iron with Sodium bisulphate until SO_3 practically disappears Exhausting the soluble matter This oxide is finest & finest we have obtained so far. Better than the oxides from oxalates there may be some water in the oxide from fusing Ferrous K sulphate also fusing other iron salts with nitrates chlorides etc to get an iron oxide in different physical states

Use double salts of Fe Tungsten $Fe\,WO_4$

If the fused & exhausted commercially we can no longer use oxalates as Oxalic Acid is to high we shall use oxide from fusion of the Ferrous Sulph which is a cheap process so in your experiments bear in mind that the value of the final result will depend upon how cheap it can be made

see the Jackets sent have an accuracy of 40% to 71% and 440 m a lbs per gram of mixture including H_2O.

80 | 446 (5.5
400
46

3 | 6.20
207 55
827
120
654
627
992
6

| 2000 (36 cents
165
5300
3300
5c

200
5000

144 | 30000 - (208
2688
12000
11552

5 | 208 -
41

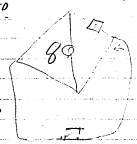
992
8
7936

6c

80

7 | 52
46

66
120
132
66
79



1400
140
1260

60

1300

9.9
+15
495
99
485

13
6
78

110 | 10000 (99
990
100
99
110
99
79
1089

15.

110
99
880
990
107

110
99
660
990
105

110 | 10000 (99
990
10000

110
99
770
990
1089

110
99
990
990
1089

Notebook, N-06-10-01.1

This notebook covers the period February-April 1907. It was used by Edison, Olav Berg, and Ludwig F. Ott as a log to record the preparation of iron compounds, numbers 3427-4507, for use in storage battery endurance tests. The front cover is labeled "Iron 3427 to 4507 Muckers—." The pages are unnumbered. Approximately 210 pages have been used.

Only the sections of the book with substantive Edison notes and marginalia have been selected.

Nos 3427 to incl recd. and entered
Feb. 26, 67 Attached by [illegible]

3427	3428
495	487
187	225
197	200
290	245
250	253

NG

NG

all to Gz 5 grammi -

3427 #1 B Non Pyrophoric 5% Hg O
3428 #1 B Non Pyrophoric 5% Hg O
3.5g Fe 80% Wo 20%

3429 #2 B Non Pyrophoric 3% Hg O
3430 #2 B Non Pyrophoric 5% Hg O
4g Fe 80% Wo 20%

3431 #2 B Selfheated 5% Hg O
3432 #2 B Selfheated 5% Hg O
4g Fe 80% Wo 20%

NG

3433 #38 Nonpyrophoric 5% HgO
3434 #38 Non Pyrophoric 5% HgO
4g Fe 80% Wo 20%

NG

3435 #38 Selfheated 5% HgO
3436 #38 Selfheated 5% HgO
4g Fe 80% Wo 20%

3437 #48 Non Pyrophoric 5% HgO
3438 #48 Non Pyrophoric 5% HgO
4g Fe 80% Wo 20%

3441	3442
1012	1020
812	687
766	624
1196	1180
1277	1230

3439 #4B Selfheated 5% HgO
3440 #4B Selfheated 5% HgO
5g Fe 80% Wo 20%

3441 #1B Non Pyrophoric 5% HgO
3442 #1B Non Pyrophoric 5% HgO
4g Fe 80% Bi 20%

3443 #1B Selfheated 5% HgO
3444 #1B Selfheated 5% HgO
4g Fe 80% Bi 20%

3445	-6
950	950
856	818
743	687
1070	1003
1035	1000

3447	8
1252	1253
318	287
287	237
1497	1477
1455	1467

3445 #2B Non Pyrophoric 5% Hg_2O
3446 #2B Non Pyrophoric 5% Hg_2O
2.50g Fe 80% Bi 20%

3447 #2B Selfheated 5% Hg_2O
3448 #2B Selfheated 5% Hg_2O
4g Fe 80% Bi 20%

3449 #3B Non Pyrophoric 5% Hg_2O
3450 #3B Non Pyrophoric 5% Hg_2O
4g Fe 80% Bi 20%
2 bottles of #3B non pyrophoric Silver Rahi says it is all right

3451 #3B Selfheated 5% HgO
3452 #3B Selfheated 5% HgO
4.g Fe 80% Bi 20%

3453 #4 B Non Pyrophoric 5% HgO
3454 #4 B Non Pyrophoric 5% HgO
5g Fe 80% Bi 20%

3455 #4 B Selfheated 5% HgO
3456 #4 B Selfheated 5% HgO
4.0g Fe 80% Bi 20%

3457 #5B Non Pyrophoric 5% HgO
3458 #5B Non Pyrophoric 5% HgO
5g Fe 80% Bi 20%

3459 #6 B Non Pyrophoric 5% HgO
3460 #6 B Non Pyrophoric 5% HgO
3g Fe 80% Bi 20%

3461 #6B Selfheated 5% HgO
3462 #6B Selfheated 5% HgO
3.5g Fe 80% Bi 20%

3463 #7B Non Pyrophoric 5% HgO
3464 #7B Non Pyrophoric 5% HgO
4.5g Fe 80% Bi 20%

3465 #8B Non Pyrophoric 5% HgO
3466 #8B Non Pyrophoric 5% HgO
4g Fe 80% Bi 20%

3467 #9B Non Pyrophoric 5% HgO
3468 #9B Non Pyrophoric 5% HgO
4g Fe 80% Bi 20%

3469 # 10 B Non Pyrophoric 5% HgO
3470 # 10 B Non Pyrophoric 5% HgO
8g Fe 80% Bi 20%

3471 # 11B Non Pyrophoric 5% HgO
3472 # 11B Non Pyrophoric 5% HgO
4g. Fe 80% Bi 20%

3473 # 11B Sulphiated 5% HgO
3474 # 11B Sulphiated 5% HgO
4.g Fe 80% Bi 20%

3475 —6

985	980
937	973
912	975
1270	1340
1330	1360

3 Grams note

3477 —5

890	825
612	615
600	606
865	790
625	625

3479 —80

830	935
700	750
425	750
855	940
677	175

3475 #1 L.O. Non Pyrophoric 5% Hg O
3476 #1 L.O. Non Pyrophoric 5% Hg O
3 g Ferrous Ammon. Sulphate

3477 #3 L.O. Non Pyrophoric 5% Hg O
3478 #3 L.O. Non Pyrophoric 5% Hg O
3.05 g Fe 80% Mg. 20%

3479 #3 L.O. Sulphuric 5% Hg O
3480 #3 L.O. Sulphuric 5% Hg O
4 g Fe 80% Mg. 20%

3481 — 2

1417	1375
925	826
1056	950
1435	1340
1447	1305

4 grms

3483 — 4

600	630
300	381
325	350
445	465
412	432

3485 — 6

905	1140
962	1031
562	662
925	1060
900	1055

3481 #4 Z.O. Non Pyrophoric 5% HgO
3482 #4 Z.O. Non Pyrophoric 5% HgO
4g Fe 80% Zn 20%

to this Zn

3483 #8 Z.O. Non Pyrophoric 5% HgO
3484 #8 Z.O. Non Pyrophoric 5% HgO
5g Fe acetate

3485 #9 Z.O. Non Pyrophoric 5% HgO
3486 #9 Z.O. Non Pyrophoric 5% HgO
5g Ferrous Carbonate

NG

ng

3491 — 2

1450	1405
800	837
875	870
1300	1292
1222	1270

4 grams

3487 #10 Z.O, Non Pyrophoric 5% H_2O
3488 #10 Z.O. Non Pyrophoric 5% H_2O
4g Ferric Carbonate

3489 #10 Z.O Selfheated 5% H_2O
3490 #10 Z.O. Selfheated 5% H_2O
4g Ferric Carbonate

3491 # 14 Z.O Non Pyrophoric 5% H_2O
3492 # 14 Z.O. Non Pyrophoric 5% H_2O
4g Fe 80% Cu 20%

Recd Feb 27 Entered and checked by [illegible]

ng

3495 — 6

1350	1395
1043	1075
1662	1125
1460	1430
1087	1200

3497 — 4

1525	1457
1125	987
1250	1125
1500	1497
1450	1330

4 gpm

3493 #1 G Selfheated 5% HgO
3494 #1 G Selfheated 5% HgO
4g Fe 80 W 20%

3495 #1 Z.O. Selfheated 5% HgO
3496 #1 Z.O. Selfheated 5% HgO
4g Ferrous Ammon Sulphate

3497 # 4 Z.O. Selfheated 5% HgO
3498 # 4 Z.O. Selfheated 5% HgO
4g Fe 80% Z 20%

NG

3503 — 4

1630	1600
1118	1050
1162	1162
1282	1152
1400	1372

3499 # 8 L.O. Selfheated 5% H_2O
3500 # 8 L.O. Selfheated 5% H_2O
4g Fe acetate

3501 # 9 L.O. Selfheated 5% H_2O
3502 # 9 L.O. Selfheated 5% H_2O
4g. Ferrous Carbonate

3503 # 14 L.O. Selfheated 5% H_2O
3504 # 14 L.O. Selfheated 5% H_2O
5g Fe 80% Cu 20%

Nothing Unusual

"

"

3505 #5B Selfheated 5% HgO
3506 #5B Selfheated 5% HgO
4g Fe 80% Bi 20%

3507 #8B Selfheated 5% HgO
3508 #8B Selfheated 5% HgO
4g Fe 80% Bi 20%

3509 #7B Selfheated 5% HgO
3510 #7B Selfheated 5% HgO
4g Fe 80% Bi 20%

Nothing Unusual

11

3515–16

400	400
193	187
125	118
300.	400
290	290

3511 #9 B Selfheated 5% HgO
3512 #9 B Selfheated 5% HgO
4g Fe 80% Bi 20%

3513 #10B Selfheated 5% HgO
3514 #10B Selfheated 5% HgO
4g Fe 80% Bi 20%

3515 #85g Selfheated 5% HgO
3516 #85g Selfheated 5% HgO
5g. Fe 70 Sb. 30

Recd from Silver Fabr Mar 12 07
and entered same date 9.00 P.M.
Checked by: Alan Berg
3517 to 3640 incl

ng

ng

ng

3517 8#5 Non Pyro 5% Hg O
3518 " " " " " "
4g 80 Fe 20 Wo

3519 8#5 Selfheated 5% Hg O
3520 " " " " " "
4g 80 Fe 20 Wo

3521 8#6 Non Pyro 5% Hg O
3522 " " " " " " "
4g Fe 80 Wo 20 + Phosphorus

Mg

Mg

Mg

3523 S"6 Selfheated 5% HgO
3524 " " " " "
4g 80Fe 20Wo with Phosphorous

3525 S"7 Non Pyro 5% HgO
3526 " " " " " " "
3.5g Fe 80% Wo 20 + Phosphorous

3527 S 7 Selfheated 5% HgO
3528 " " " " "
3.5g Fe 80 Wo 20 + Phosphorous

Very Bad 5 to V
Manganese bad

Very Bad 5 to V
Mn

3533–34

1262	1200
897	762
1050	997
1300	1257
1500	1470

4 grams

3529 B 81 Non Pyro 5% Hg O
3530 " " " " " " "
4 g Fe 80 Bi 10 Mn 20

3531 B 81 Sulphated 5% Hg O
3532 " " " " " "
4 g Fe 80 Bi 10 Mn 20

3533 B 12 Non Pyro 5% Hg O
3534 " " " " " "
4 g 80 Fe 20 Bi.

Nothing Unusual

"

"

3535 B 12 Selfheated 5% HgO
3536 B 12 " " " "
4g 80 Fe 20 Bi.

3537 B 13 Non Pyro 5% HgO
3538 " " " " " "
4g 80 Fe 20 Bi.

3539 B 13 Self heated 5% HgO
3540 " " " " " "
4g 80 Fe 20 Bi

Nothing recorded

1)

11
11

3541 B 14 Non Pyro 5% Hg O
3542 " " " " " " "
4g Fe 80 Bi 20

3543 B 14 Selfheated 5% Hg O
3544 " " " " " "
5g Fe 80 Bi 20

3545 B 15 Non Pyro 5% Hg O
3546 " " " " " " "
5g Fe 80 Bi 20

			Hot 100
4172			1525
73			1525
74			1520
75			1570
76			1620
77			1575

75-6-7 in NaOH. ann on 750 rate 425 687 825

4172-3-4 — KOH " 875 987 975

KOH much better on high rates.

4172
4173
4174 } Regular 5 gram non-assembled with 2 Nickel Tubes - to run on ~~hot test two Ni tubes~~ - 21% KOH Containing 2 grms LiOH in each

Calc — 300 Hot — 1330 (V) 2080 (½ V)
1265 2035
1190 1950

4175
4176
4177 } Dup of 4172 Except 15% NaOH. Containing 2 grms LiOH in each

Calc —
15% NaOH 2 LiOH 300 hot
700 1140
930 1485
725 1165

4178
4179) (W) 59 Non Pyro 5% H_2O
Plain Iron
4.5 g Fx only

4180
4181 (W) 59 self heated 5% Hg O
Plain iron
4.5g
Fe only

4182
4183 (W) 68 non type 5% Hg O
Plain iron
4.5g
Fe only

4184
4185 (W) 68 self heated 5% Hg O
Plain iron
4.5g
Fe only

4186 (W) 69 non typ 5% HgO
4187 P Lindrum
4g Fe only

4188 (W) 69 self heated 5% HgO
4189 P Lewis drum
4.5g Fe only

*190 (W) 75 non typ 5% HgO
*191 Fe & Cu
5.5g Fe + Cu

4192 (W) 75 sulphated 5% MgO
4193 Fe & Zn
5.5g Fe + Zn

4194 (W) 78 roasted 5% MgO
4195 Fe & Zn
4.5g Fe + Zn

4196 (W) 78 sulphated 5% MgO
4197 Fe & Zn
4.5g Fe + Zn

4198 (W) 79 non hypo 5% HgO
4199 Fe + Cu
5.5g Fe + Zn + Cu

4200 (W) 79 sulphurated 5% HgO
4201 Fe + Cu
5.5g Fe + Zn + Cu

4202 (W) 108 non hypo 5% HgO
4203 Fe + Cu
5.5g

4204
4205 (W) 108 sulphurated 5% HgO
Fe + Bi
5.5g

4206
4207) B 59 non-pyro 5% HgO
Fe 80 Bi 20
7.5g

4208
4209) B 59 sulphurated 5% HgO
Fe 80 Bi 20
7.5g

4210
4211) B 61 non pyro 5% HgO
Fe 95 Bi 5
4g

4212
4213) B 61 sulphated 5% HgO
Fe 95 Bi 5
4g

4214
4215) B 62 non pyro 5% HgO
Fe 95 Bi 5
4.5g

4216
4217) B 62 sulphuated 5%/0 Hg O
Fe 95 Bi 5
4.5g

4218
4219) B 63 non hydro 5%/0 Hg O
Fe 95 Bi 5
3.5g

4220
4221) B 63 sulphuated 5%/0 Hg O
Fe 95 Bi 5
4.5g

4222
4223) B 64 nonfyro 5% Hg O.
Fe 95 Bi S
4.5g

4224
4225) B 64 selfheated 5% Hg O
Fe 95 Bi S
4.5g

4226
4227) B 65 nonfyro 5% Hg O
Fe 95 Bi S
4.5g

4228
4229) B 65 selfheated 5% HgO
4.5g Fe95Bi5

4230
4231) B 66 non pyro 5% HgO
Fe80Bi20
6.g

4232
4233) B 66 selfheated 5% HgO
Fe80Bi20
5.5g

4234
4235) B 67 non ppt 5%alloy 0

Fe95Bi5

5g

4236
4237) B 67 calcinated 5%alloy 0

Fe95Bi5

5g

4238
4239) B 68 non ppt 5%alloy 0

Fe95Bi5

5g

4240
4241) B 68 sulphated 5% HgO
$Fe_{.95}Bi_{.5}$
5g

4242
4243) B 69 non sulph. 5% HgO
$Fe_{.95}Bi_{.5}$
4.5g

4244
4245) B 69 sulphated 5% HgO
$Fe_{.95}Bi_{.5}$
4.5g

4246
4247 } B 70 non pyro 5%/Hg O
Fe 75 Bi 5
4g

4248
4249 } B 70 non pyro 5%/Hg O
Fe 75 Bi 5
4g

4250
4251 } B 71 selfheated 5%/Hg O
Fe 75 Bi 5
4g

4252
4253) B 72 monpyro 5/0Hg0

FeSBi5

4g

4254
4255) B 72 sulphated 5/0Hg0

FeSBi5

4g

4256
4257) B 73 monpyro 5/0Hg0

FeSBi5

4g

4258
4259) B 73 reflheated 5% HgO
$Fe_{95}Bi_5$
4g

4260
4261) B 74 non paper 5% HgO
$Fe_{95}Bi_5$
4g

4262
4263) B 74 reflheated 5% HgO
$Fe_{95}Bi_5$
4.5g

4264
4265) B 75 nonpyro 5% HgO
Fe 99 Bi 1?
4g

4266
4267) B 75 reflected 5% HgO
Fe 99 Bi 1?
4g

4268
4269) B 76 nonpyro 5% HgO
Fe 95 Bi 5
4g

4270
4271) B 76 selfheated 5% H_2O
$Fe_{95}Bi_5$
4g

4272
4273) Glaster 26 non pyro 5% H_2O
$Fe_{80}Sb_{20}$
4g

4274
4275) Glaster 26 selfheated 5% H_2O
$Fe_{80}Sb_{20}$
4g

4276
4277) Glaster 27 non hyp 5% H2O
Fe 80 Sb 20

5,5g

4278
4279) Glaster 27 selfheated 5% H2O
Fe 80 Sb 20

5,5g

4280
4281) Glaster 28 non hyp 5% H2O
Fe 80 Sb 20

7g

4282
4283) Glaister 28 selfheated 5% H2O
Fe 80 Sb-20
6.5g

4284
4285) Glaister 29 non-pyro 5% H2O
Fe 80 Sb-20
4.5g

4286
4287) Glaister 29 selfheated 5% H2O
Fe 80 Sb-20
4.5g

4288
4289 Glaistu 30 non pyro 5%MgO
Fe80Al20
5,5g

4290
4291 Glaistu 30 selfheated 5%MgO
Fe80Al20
5,5g

4292
4293 Glaistu 31 non pyro 5%MgO
Fe80Al20
4,5g

4294
4295) Glaister 31 selfheated 5%HgO
FeSbL20
4.5g

4296
4297) Glaister 32 selfheated 5%HgO
FeSbL20
6g

4298
4299) Glaister 32 non pyro 5%HgO
FeSbL20
6g

N.B. Pb & with cage chin. % are approximate see Rin.

4300
4301) Phenter 33 non pyro 5% H2O
Fe80Sb20
5g

4302
4303) Phenter 33 oxidized 5% H2O
Fe80Sb20
5g

4304
4305) P 61 non pyro 5% H2O
Fe80 Mo20
5g

4306
4307) B 61 reflected 5%HgO
$FeSO_4WO_2O$
4.5g

4308
4309) B 62 non pyro 5%HgO
$FeSO_4WO_2O$
4g

4310
4311) B 62 reflected 5%HgO
$FeSO_4WO_2O$
3g

4312
4313) G 63 non pyro 5%HgO
Fe 80 Ni 20

5g

4314
4315) G 63 selfheated 5%HgO
Fe 80 Ni 20

4g

4316
4317) G 65 non pyro 5%HgO
Fe 80 Ni 20

4g

4318
4319) 8 65 reflluated 5% HgO
Fe80 Wo20
3.5g

4320
4321) 8 66 nonflux 5% HgO
Fe80 Wo20
3.5g

4322
4323) 8 66 reflluated 5% HgO
Fe80 Wo20
3g

4324
4325) B 67 non pyro 5% H_2O
$Fe_{80}W_{20}$
4g

4326
4327) B 67 calcinated 5% H_2O
$Fe_{80}W_{20}$
4g

4328
4329) B 68 non pyro 5% H_2O
$Fe_{80}W_{20}$
4g

4330
4331) Y 68 selfheated 5% of HgO
Fe 80 W 020

4g

4332
4333 Reg mix from which has
been in 33% several days
on hot plate & then washed
press of KOH — 5 grms

5g

4334 Ra 1001 A 10% HgO
4335 " } To be run on hot
4336 } Enclosure in 21% KOH,

4336 - Ra 1001 - A 12½% KOH, 3 grms di OH,
251 Hot - 1490 2305 to be run on hot enclosure
1520 2360
1600 2389

Ra 1001 C – 5% Hg O

4337 } Put up 2 ni tubes 21% KOH,
4338 } Run Hot endurance
251 Hot 1608 2270
1925 2345
1561 2295

Ra 1001 C 5% Hg O

4339 Put up 2 nickel tubes 21% KOH
3 grms Li OH, Run hot endurance

5% Hg O

4340 } Ra 1001 B – Put up with 2 nickels –
4341 } 21% KOH, Run hot Endurance
251 Hot 1695 2524
1565 2387
1615 2345

5% Hg O

4342 Ra 1001 B put up 2 nickels 21%
3 grms Li OH, Run Hot endurance –

4343 (W) 86 nm tyre 5% Hg O
4344 " " "
4.5 g

Fe Cu + Chrom

4345 (W) 86 Selfhardened 5% Hg O
4346 4g " " "
Fe Cu chrom

4347 (W) 87 non fusion 5% Hg O
4348 " " "
4g Fe Cu chrom

4349 (W) 87 Selfhardened 5% Hg O
4350 " " "
3.5g Fe Cu chrom

4351 (W) 88 non fypro 5% HgO
4352 " " "
4g Fe blue

4353 (W) 88 sulphiated 5% HgO
4354 " " "
5g Fe blue

4355 (W) 89 non fypro 5% HgO
4356 " " "
4.5g Fe Sulfate Fe

4357 (W) 89 Lyophilized 50% Hg 0
4358 4g " " "
Cu Zinc Fe

4359 (W) 109 non pyro 50% Hg 0
4360 " " "
5g
Fe + Cu

4361 (W) 109 self healed 50% Hg 0
4362
5.5g Fe + Cu

4363 (W) 110 non pyro 5% Hg O
4364 3g
Fe + Cu

4365 (W) 110 Sulphated 5% Hg O
4366 3.5g
Fe + Cu

4367 B 77 non pyro 5% Hg O
4368 3.5g
Fe 45 Bi 5

Good

4369 B 77 selfheated 5% HgO
4370 6g
good
F<45 Bi 5

4371 B 78 non pyro 5% HgO
4372
5g F<95 Bi 5

4373 B 78 selfheated 5% HgO
4374 5.5g F<95 Bi 5
good

4375 B 79 non pyro 5% HgO
4376 5g Fe 95 Ni 5

4377 B 79 sulphuric 5% HgO
4378 good 5g Fe 95 Ni 5

4379 B 80 non pyro 5% HgO
4380 6g Fe 95 Ni 5

4:381 B80 selfheated 5% Hg O
4:382 7g Fe4SBi5

4:383 B81 monpyro 5% Hg O
4:384 4g Fe4SBi5

4:385 B81 selfheated 5% Hg O
4:386 5.5g Fe4SBi5

4387 B82 non pyro 5% HgO
4388 Fe95Bi5
4.5g

4389 B82 selfburned 5% HgO
4390 Fe95Bi5
[redacted] 4.5g

4391 B83 non pyro 5% HgO
4392 5g Fe95Bi5
good

4393 B 83 selfheated 5% HgO
4394 5g
Fe95Bi5
good

4395 B 84 non hyro 5% HgO
4396 4g
Fe95Bi5

4397 B 84 selfheated 5% HgO
4398 5g
Fe95Bi5
good

4399 B 85 non typo 5% Hg 0
4400 6g
Fe 95 Bi 5

4401 B 85 reheated 5% Hg 0
4402 6g
good
Fe 95 Bi 5

4403 B 86 non typo 5% Hg 0
4404
5g
Fe 95 Bi 5

4405 B 86 selfheated 5% Hg-0
4406
6g
Fe 95 Bi 5

4407 B 87 non hyst 5% Hg 0
4408
3g
~~Fe 95 Bi 5~~
Fe only

4409 B 87 selfheated 5% Hg 0
4410
3.5g
Fe only

4411 B 88 non pyro 5% HgO
4412 4g F=99 Bi 1

4413 B 88 self heated 5% HgO
4414 4g F=99 Bi 1

4415 B 89 non pyro 5% HgO
4416 3.5g F=98 Bi 2

4417 B 89 selfheated 5% HgO
4418 4g Fe98Bi2
good

4419 B 90 non pyro 5% HgO
4420 3g Fe95Bi5

4421 B 90 selfheated 5% HgO
4422 3.5g Fe95Bi5
good

4423 B91 non pyro 5% HgO
4424 " "

F<95Ri5

4425 B 91 selfheated 5% HgO
4426 " "

F<95Ri5

4427 B 92 non pyro 5% HgO
4428 " "

F<95Ri5

4429 B 92 selfheated 5%HgO
4430 4g
Fe95Bi5

Good

4431 B 93 non fuyso 5%HgO
4432 4.5g
Fe95Bi5

4433 B 93 selfheated 5%HgO
4434 5g
Fe95Bi5

4435 B 69 non pyro 5% HgO
4436 4g
Fe 80 W 20

4437 B 70 selfheated 5% HgO
4438 45g
Fe 80 W 20

4439 B 70 non pyro 5% HgO
4440 4g
Fe 80 W 20

4441 ⊖ 71 non fuse 5% HgO
4442 4g

Fe 80 W 20.

4443 ⊖ 69 nelfiscated 5% HgO
4444 3.5g

Fe 80 W 20.

4445 RA 1006 — Ferrous Nitrate
4446 10% HgO —
5 grammes
4 nickel tubes — 21% 2 grms
2 Off Each Cell —
Half Endurance —
Cobalt flake 258 Hot 1610 2758 1525 2153

4447 RA 1006 — 7% Na SO4 —
4448 10% HgO —
5 grms

4 nickel Tubes run 21% KOH
only — Hot Fuderunas
258 Hrs: 1040 1520
1285 1930 Cobalt flake

4449 } Ferrous Sodium Sulphate
4450 } Cluster #36 3rd Crystallization
4 grms Selfheated 10% HgO

4451 } Ferrous Sodium Sulphate
4452 } Cluster #39 6th Crystallization
4 grms Selfheated 10% HgO

4453 } Ferrous Sodium Sulphate
4454 } Cluster #41 8th Crystallization
4 grms Selfheated 10% HgO

4455 } Ferrous Sodium Sulphate
4456 } Cluster #42 4th Crystallization
4 grms Selfheated 10% HgO

4457 to incl are special irons
Mr. Edison asked Dr Grothe to make

4457
4458 } B 47 #1 non pyro 5% Hg O

4459
4460 } B 47 #1 selfheated 5% Hg O

4461
4462 } B 47 #2 non pyro 5% Hg O

4463
4464 } B 47 #2 selfheated 5% Hg O

4465
4466 } B 47 #3 non pyro 5% Hg O

4467
4468 } B 47 #3 selfheated 5% Hg O

4469
4470 } B 47 #4 non pyro 5% Hg O

4471
4472 } B 47 #4 selfheated 5% Hg O

4473
4474 } E 47 #5 nonfyro 5% Hg O

4475
4476 } E 47 #5 selfheated 5% Hg O

4477
4478 } Glaister # 34 Ferrous Sod. Sulphate
1st crystallization: No Hg O
selfheated

4479
4480 } Glaister 34 Ferrous Sod Sulphate
1st cryst. 10% Hg O selfheated

4481
4482 } Glaister 35 Ferrous Sod Sulphate
2nd Cryst. 10% Hg O self-heated

4483
4484 } Glaister 37 Ferrous Sod Sulphate
4th cryst selfheated 10% Hg O

4485
4486 } Glaister 38 Ferrous Sod sulphate
#5 cryst. Selfheated 10% Hg O

4487
4488 } Glaister # 40 Ferrous Sod Sulph.
selfheated 7th cryst 10% Hg O

4489
4490 } Glaister # 43 Ferrous Sod Sulph.
10 cryst. selfheated 10% Hg O

4491 etc Vset Efficy 72.6 %
92 a.H. 79.3
93 KOH. 57.5

Na'better than Reg

Goneto Hooper for Ref

Steel,

4491 } 3 flat packets, oxidized black, and
4492 } raw through hydrogen
4493 } 5 gm #1034 Sum. 21% KOH. Run. Reg.
158 Hot } 1385 1960
925 1370
1010 1495

4494 Exp. No 5 Pocket. Flat Pocket oxidized over bunsen then coated with conc. sol of Ni Acetate and oxidized over bunsen (Repeated 3 times) then reduced in H heated with 792 Mix (reg iron) 21% KOH.

4495 Same as 4494 except loaded with #1034 Mix
4496 21% KOH

4496 Exp. No 9 Pocket coated with a mush made of Anhyd. Ni Oxide and H_2O oxidized over bunsen, heated just a little more than would drive off the H_2O (this repeated twice) no previous oxidization of pocket before coating loaded with #792 Mix (reg Fe) 21% KOH

4497 Same as 4496 except loaded with #1034 Mix
4499 21% KOH

4498 Exp. No 10 Same as the No 9 Exp. #4496 except that the mush was made slightly alkaline by the addition of KOH Loaded #792 Mix
21% KOH

4499 Same as 4495 except loaded with
#1034 Mix 21% KOH

4494 to 4499 Steel pot cif against 4 nickels (TUBES)

The reason the cells on the other page were marked with A after them was because there were other runs from the numbers that were duplicate

4495
4496 - 4497 - 4498 - 4499

4495A
4496A } 2 Grows 8½ gram
100 Sp 100 Cotr — first
Make in big 16 chromosome

4495 #01 Cells 127 #02 4496 Cells 125
Size 141 Size 140
" 144 " 140

4497 A 2 Nickel tubes
each 2 mm —

Reg 5 mm 2 mm used in test
Cell. with Tubes — dipped 45 minutes
in CP Rich acetone free from 2 mm
then dried hot plate — then KOH,
washed free Chloride in cold water
Seal —

21% KOH, after running
Reg gave to Holland for
Ecolony test then built
on hot test 25 times
Run Cold & gave to Holland
for further tests then put
back hot test

4498 A Dup ref on 6-0-0-2
but 21% KOH 2 grams KOH.

		V	V
25 Hot.	4497	2075	3045
	4498	2100	3083

gave about 1300 on 750.

Cell 7½ have in new process 7½
used in test cells past 6 months —

4499A Edison 88 Reg 5 gm non same as used on test cells — Soaked 15 min $BiCl_3$ dried little — then soaked few minutes KSO4 — washed little then in KOH dilute for in cells — KOH not washed out 4 times — 1600 — V.

4500 Dup of 4499 except Conc $BiCl_3$ NH_4Cl — then KOH — Edison 89 1850 V

4501 Edison No 90 ½ strong cl $BiCl_3$ NH_4Cl dried then Little Clean KOH, 1825 V

4502 Edison 91. Soaked $SrCl_2$ then KSO4 1300

4503 Edison 92 $MgCl_2$ then KOH 995

4504 Edison 93 Ferric Sulphate (ferric) then KOH 1880

4505 Edison 94 Cadmium Sulphate then KOH — 710

Above in 2% KOH

4506 — E 97 — Reg 5 gm 7½ — dipped Conc $BiCl_3$ in XCP acetone (10 $BiCl_3$ in acetone distilled) pocket not washed acetone, only dried a little — then KOH 20 washed — 1945 V

4507 = E 95 5 gm Reg 7½ used test cells ~~Dipped~~ Soaked chromate K. then ~~dipped~~ dipped $BaCl_2$ = washed clean KOH washed — 2% KOH. 900

(W) 28 Hatchets Brown

(W) 32. Ferrous Cupri Ammon chloride.

(W) 33. Ferric oxyde + Ammon chloride.

(W) 41 Ferrous Ammon sulfate.

(W) 42. Ferrous Zinc K sulfate Sodium chloride.

(W) 43. Ferrous Zinc K sulfate

(W) 48. Cupric Ferrous Ammon sulfate.

(W) 50 Ferrous Meth. nitrate

(W) 51 Ferrous Cupri Stannous Zinc Cadmium ~~oxalate~~ oxyde.

(W) 53. Ferric oxyde + Sodium chloride + Sod. sulfate.

(W) 54. Ferrous Ammon sulfate

(W) 55 Ferric Ammon chloride.

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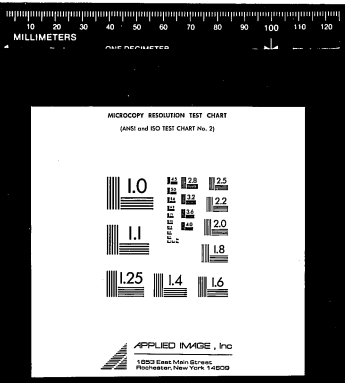
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